

165                                      170                                      175  
 Lys Lys Glu Asn Gly Leu Val Ile Leu Thr Ser His Ile Ser Glu Asp  
    180                                      185                                      190  
 Ile Ser Asp Leu Cys Thr Asp Val Leu Val Val Glu Asn Gly His Ile  
    195                                      200                                      205  
 Gln Met  
    210  
 <210> 365  
 <211> 97  
 <212> PRT  
 <213> Streptococcus pneumoniae  
 <400> 365  
 Met Arg Ser Met Thr Arg Leu Ala Ser Gln Val Ser Ser Phe Pro Cys  
 1                                      5                                      10                                      15  
 Phe Thr Phe Ala Lys Cys Phe Ser Lys Ser Ser Lys Leu Lys Leu Asp  
    20                                      25                                      30  
 Val Lys Lys Val Gly Lys Phe Ser Cys Ile Arg Tyr Trp Arg Met Thr  
    35                                      40                                      45  
 Cys Arg Ile Ser Ser Arg Thr Gln Thr Val Asp Cys Ser Ala Pro Ile  
    50                                      55                                      60  
 Ser Ser Lys Ile Arg Thr Ser Asp Ser Leu Ile Ser Ser Thr Lys Val  
 65                                      70                                      75                                      80  
 Leu Thr Leu Pro Ser Leu Ile Ala Phe Leu Thr Ser Met Thr Lys Leu  
    85                                      90                                      95  
 Gly

<210> 366  
 <211> 501  
 <212> PRT  
 <213> Streptococcus pneumoniae

&lt;400&gt; 366

Met Ile Ile Leu Lys Glu Phe Lys Pro Met Ser Leu Leu Val Phe Glu  
 1 5 10 15

Asn Val Ser Lys Ser Tyr Gly Ala Thr Pro Ala Leu Glu Asn Val Ser  
 20 25 30

Leu Asp Ile Pro Ala Gly Lys Ile Val Gly Leu Leu Gly Pro Asn Gly  
 35 40 45

Ser Gly Lys Thr Thr Leu Ile Lys Leu Ile Asn Gly Leu Leu Gln Pro  
 50 55 60

Asp Gln Gly Arg Val Leu Ile Asn Asp Met Asp Pro Ser Pro Ala Thr  
 65 70 75 80

Lys Ala Val Val Ala Tyr Leu Pro Asp Thr Thr Tyr Leu Asn Glu Gln  
 85 90 95

Met Lys Val Lys Glu Ala Leu Thr Tyr Phe Lys Thr Phe Tyr Lys Asp  
 100 105 110

Phe Asn Leu Glu Arg Ala His His Leu Leu Ala Asp Leu Gly Ile Asp  
 115 120 125

Glu Asn Ser Arg Leu Lys Lys Leu Ser Lys Glu Asn Lys Glu Lys Val  
 130 135 140

Gln Leu Ile Leu Val Met Ser Arg Asp Ala Arg Leu Tyr Val Leu Asp  
 145 150 155 160

Glu Pro Ile Gly Gly Val Asp Pro Ala Ala Arg Ala Tyr Ile Leu Asn  
 165 170 175

Thr Ile Ile Asn Asn Tyr Ser Pro Thr Ser Thr Val Leu Ile Ser Thr  
 180 185 190

His Leu Ile Ser Asp Ile Glu Pro Ile Leu Asp Glu Ile Val Phe Leu  
 195 200 205

Lys Asp Gly Lys Val Val Arg Gln Gly Asn Val Asp Asp Ile Arg Tyr

210		215		220
Glu Ser Gly Glu Ser Ile Asp Gln Leu Phe Arg Gln Asn Leu Arg Pro				
225		230	235	240
Lys Gln Arg Arg Leu Phe Met Phe Trp Asn Leu Val Arg Tyr Glu Phe				
	245		250	255
Lys Asn Val Asn Lys Trp Tyr Leu Ala Leu Tyr Ala Ala Val Leu Val				
	260		265	270
Leu Ser Ala Leu Ile Gly Ile Gln Thr Gln Gly Phe Lys Asn Leu Pro				
	275		280	285
Tyr Gln Glu Ser Gln Ala Thr Met Leu Leu Phe Leu Ala Thr Val Phe				
	290		295	300
Gly Gly Leu Met Leu Thr Leu Gly Ile Ser Thr Ile Phe Leu Ile Ile				
305		310	315	320
Lys Arg Phe Lys Gly Ser Val Tyr Asp Arg Gln Gly Tyr Leu Thr Leu				
	325		330	335
Thr Leu Pro Val Ser Glu His His Ile Ile Thr Ala Lys Leu Ile Gly				
	340		345	350
Ala Phe Ile Trp Ser Leu Ile Ser Thr Ala Val Leu Ala Leu Ser Ala				
	355		360	365
Val Ile Ile Leu Ala Leu Thr Ala Pro Glu Trp Ile Pro Leu Ser Tyr				
	370		375	380
Val Ile Thr Phe Val Glu Thr His Leu Pro Gln Ile Phe Leu Thr Gly				
385		390	395	400
Ile Ser Phe Leu Leu Asn Thr Ile Ser Gly Ile Leu Cys Ile Tyr Leu				
	405		410	415
Ala Ile Ser Ile Gly Gln Leu Phe Asn Glu Tyr Arg Thr Ala Leu Ala				
	420		425	430

Val Ala Val Tyr Ile Gly Ile Gln Ile Val Ile Gly Phe Ile Glu Leu  
 435 440 445

Phe Phe Asn Leu Ser Ser Asn Phe Tyr Val Asn Ser Leu Val Gly Leu  
 450 455 460

Asn Asp His Phe Tyr Met Gly Ala Gly Ile Ala Ile Val Glu Glu Leu  
 465 470 475 480

Ile Phe Ile Ala Ile Phe Tyr Leu Gly Thr Tyr Tyr Ile Leu Arg Asn  
 485 490 495

Lys Val Asn Leu Leu  
 500

<210> 367

<211> 381

<212> PRT

<213> Streptococcus pneumoniae

<400> 367

Met Val Thr Pro Phe Val Thr Leu Leu Val Met Ser Ile Leu Gly Leu  
 1 5 10 15

Phe Val Ile Gly Pro Val Phe His Val Val Glu Asn Tyr Ile Leu Ile  
 20 25 30

Ala Thr Lys Ala Ile Leu Ser Met Pro Phe Gly Leu Gly Gly Phe Leu  
 35 40 45

Ile Gly Gly Val His Gln Leu Ile Val Val Ser Gly Val His His Ile  
 50 55 60

Phe Asn Leu Leu Glu Val Gln Leu Leu Ala Ala Asp His Ala Asn Pro  
 65 70 75 80

Phe Asn Ala Ile Ile Thr Ala Ala Met Thr Ala Gln Gly Ala Ala Thr  
 85 90 95

Val Ala Val Gly Val Lys Thr Lys Asn Pro Lys Leu Lys Thr Leu Ala  
 100 105 110



Phe Pro Ala Ala Leu Ser Ala Phe Leu Gly Ile Thr Glu Pro Ala Ile  
 115 120 125

Phe Gly Val Asn Leu Arg Phe Arg Lys Pro Phe Phe Leu Ser Leu Ile  
 130 135 140

Ala Gly Ala Ile Gly Gly Gly Leu Ala Ser Ile Leu Gly Leu Ala Gly  
 145 150 155 160

Thr Gly Asn Gly Ile Thr Ile Ile Pro Gly Thr Met Leu Tyr Val Gly  
 165 170 175

Asn Gly Gln Leu Pro Gln Tyr Leu Leu Met Val Ala Val Ser Phe Ala  
 180 185 190

Leu Gly Phe Ala Leu Thr Tyr Met Phe Gly Tyr Glu Asp Glu Val Asp  
 195 200 205

Ala Thr Ala Ala Ala Lys Arg Ala Glu Val Ala Glu Glu Lys Glu Glu  
 210 215 220

Val Ala Pro Ala Ala Leu Gln Asn Glu Thr Leu Val Thr Pro Ile Val  
 225 230 235 240

Gly Asp Val Val Ala Leu Ala Asp Val Asn Asp Pro Val Phe Ser Ser  
 245 250 255

Gly Ala Met Gly Gln Gly Ile Val Val Lys Pro Ser Gln Gly Val Val  
 260 265 270

Tyr Ala Pro Ala Asp Ala Glu Val Ser Ile Ala Phe Pro Thr Gly His  
 275 280 285

Ala Phe Gly Leu Lys Thr Arg Asn Gly Ala Glu Val Leu Ile His Val  
 290 295 300

Gly Ile Asp Thr Val Ser Met Asn Gly Asp Gly Phe Glu Thr Lys Val  
 305 310 315 320

Ala Gln Gly Asn Lys Val Lys Ala Gly Asp Val Leu Gly Thr Phe Asp  
 325 330 335

Ser Asn Lys Ile Ala Ala Ala Gly Leu Asp Asp Thr Thr Met Val Ile  
 340 345 350

Val Thr Asn Thr Gly Asp Tyr Ala Ser Val Ala Pro Val Ala Thr Gly  
 355 360 365

Ser Val Ala Lys Gly Asp Ala Val Ile Glu Val Lys Ile  
 370 375 380

<210> 368

<211> 249

<212> PRT

<213> Streptococcus pneumoniae

<400> 368

Met Gln Met Asn Asn Gln Glu Ile Ala Lys Lys Val Ile Asp Ala Leu  
 1 5 10 15

Gly Gly Arg Glu Asn Val Asn Ser Val Ala His Cys Ala Thr Arg Leu  
 20 25 30

Arg Val Met Val Lys Asp Glu Glu Lys Ile Asn Lys Glu Val Ile Glu  
 35 40 45

Asn Leu Glu Lys Val Gln Gly Ala Phe Phe Asn Ser Gly Gln Tyr Gln  
 50 55 60

Ile Ile Phe Gly Thr Gly Thr Val Asn Lys Met Tyr Asp Glu Val Val  
 65 70 75 80

Val Leu Gly Leu Pro Thr Ser Ser Lys Asp Asp Met Lys Ala Glu Val  
 85 90 95

Ala Lys Gln Gly Asn Trp Phe Gln Arg Ala Ile Arg Thr Phe Gly Asp  
 100 105 110

Val Phe Val Pro Ile Ile Pro Val Ile Val Ala Thr Gly Leu Phe Met  
 115 120 125

Gly Val Arg Gly Leu Phe Asn Ala Leu Glu Met Pro Leu Pro Gly Asp  
 130 135 140

Phe Ala Thr Tyr Thr Gln Ile Leu Thr Asp Thr Ala Phe Ile Ile Leu  
145 150 155 160

Pro Gly Leu Val Val Trp Ser Thr Phe Arg Val Phe Gly Gly Asn Pro  
165 170 175

Ala Val Gly Ile Val Leu Gly Met Met Leu Val Ser Gly Ser Leu Pro  
180 185 190

Asn Ala Trp Ala Val Ala Gln Gly Gly Glu Val Thr Ala Met Asn Phe  
195 200 205

Phe Gly Phe Ile Pro Val Val Gly Leu Gln Gly Ser Val Leu Pro Ala  
210 215 220

Phe Ile Ile Gly Val Val Gly Ala Lys Phe Glu Lys Ala Val Arg Lys  
225 230 235 240

Leu Phe Gln Met Ser Leu Thr Ser Trp  
245

<210> 369

<211> 201

<212> PRT

<213> Streptococcus pneumoniae

<400> 369

Met Arg Leu Met Lys Ile Trp Tyr Asn Glu Ile Lys Glu Phe Tyr Met  
1 5 10 15

Gln Lys Phe Ile Gln Ala Tyr Ile Glu Lys Leu Asp Val Thr Thr Ile  
20 25 30

Ile Glu Asn Ile Leu Thr Lys Val Ile Ser Leu Leu Leu Leu Ile  
35 40 45

Val Phe Tyr Ile Ala Lys Lys Met Leu His Thr Met Val Gln Arg Ile  
50 55 60

Val Lys Pro Ser Leu Lys Met Ser Arg His Asp Val Gly Arg Gln Lys  
65 70 75 80

Thr Ile Ser Arg Leu Leu Glu Asn Val Phe Asn Tyr Thr Leu Tyr Phe  
85 90 95

Phe Leu Leu Tyr Cys Ile Leu Ser Ile Leu Gly Leu Pro Val Ser Ser  
100 105 110

Leu Leu Ala Gly Ala Gly Ile Ala Gly Val Ala Ile Gly Met Gly Ala  
115 120 125

Gln Gly Phe Leu Ser Asp Val Ile Asn Gly Phe Phe Ile Leu Phe Glu  
130 135 140

Arg Gln Leu Asp Val Gly Asp Glu Val Val Leu Thr Asn Gly Pro Ile  
145 150 155 160

Thr Val Ser Gly Lys Val Val Ser Val Gly Ile Arg Thr Thr Gln Leu  
165 170 175

Arg Ser Glu Glu Gln Ala Leu His Phe Val Pro Asn Arg Asn Ile Thr  
180 185 190

Val Val Ser Asn Phe Ser Arg Thr Asp  
195 200

<210> 370  
<211> 598  
<212> PRT  
<213> Streptococcus pneumoniae

<400> 370

Met Glu Gln Lys His Arg Ser Glu Phe Pro Glu Lys Glu Leu Trp Asp  
1 5 10 15

Leu Thr Ala Leu Tyr Gln Asp Arg Glu Asp Phe Leu Arg Ala Ile Glu  
20 25 30

Lys Ala Arg Glu Asp Ile Asn Gln Phe Ser Arg Asp Tyr Lys Gly Asn  
35 40 45

Leu His Thr Phe Glu Asp Phe Glu Lys Ala Phe Ala Glu Leu Glu Gln  
50 55 60

Ile Tyr Ile Gln Met Ser His Ile Gly Asn Tyr Gly Phe Met Pro Gln  
65 70 75 80

Thr Thr Asp Tyr Ser Asn Asp Glu Phe Ala Asn Ile Ala Gln Ala Gly  
85 90 95

Met Glu Phe Glu Thr Asp Ala Ser Val Ala Leu Thr Phe Phe Asp Asp  
100 105 110

Ala Leu Val Ala Ala Asp Glu Glu Val Leu Asp Arg Leu Gly Lys Leu  
115 120 125

Pro His Leu Thr Ala Ala Ile Arg Gln Ala Lys Ile Lys Lys Ala His  
130 135 140

Tyr Leu Gly Ala Asp Val Glu Lys Ala Leu Thr Asn Leu Gly Glu Val  
145 150 155 160

Phe Tyr Ser Pro Gln Asp Ile Tyr Thr Lys Met Arg Ala Gly Asp Phe  
165 170 175

Glu Met Ala Asp Phe Glu Ala His Gly Lys Thr Tyr Lys Asn Ser Phe  
180 185 190

Val Thr Tyr Glu Asn Phe Tyr Gln Asn His Glu Asp Ala Glu Val Arg  
195 200 205

Glu Lys Ser Phe Arg Ser Phe Ser Glu Gly Leu Arg Lys His Gln Asn  
210 215 220

Thr Ala Ala Ala Ala Tyr Leu Ala Gln Val Lys Ser Glu Lys Leu Leu  
225 230 235 240

Ala Asp Met Lys Gly Tyr Asp Ser Val Phe Asp Tyr Leu Leu Ala Glu  
245 250 255

Gln Glu Val Asp Arg Val Met Phe Asp Arg Gln Ile Asp Leu Ile Met  
260 265 270

Lys Asp Phe Ala Pro Val Ala Gln Arg Tyr Leu Lys His Val Ala Lys  
275 280 285

Val Asn Gly Leu Glu Lys Met Thr Phe Ala Asp Trp Lys Leu Asp Leu  
 290 295 300

Asp Ser Ala Leu Asn Pro Glu Val Thr Ile Asp Asp Ala Tyr Asp Leu  
 305 310 315 320

Val Met Lys Ser Val Glu Pro Leu Gly Gln Glu Tyr Cys Gln Glu Val  
 325 330 335

Ala Arg Tyr Gln Glu Glu Arg Trp Val Asp Phe Ala Ala Asn Ser Gly  
 340 345 350

Lys Asp Ser Gly Gly Tyr Ala Ala Asp Pro Tyr Arg Val His Pro Tyr  
 355 360 365

Val Leu Met Ser Trp Thr Gly Arg Leu Ser Asp Val Tyr Thr Leu Ile  
 370 375 380

His Glu Ile Gly His Ser Gly Gln Phe Ile Phe Ser Asp Asn His Gln  
 385 390 395 400

Ser Tyr Phe Asn Ala His Met Ser Thr Tyr Tyr Val Glu Ala Pro Ser  
 405 410 415

Thr Phe Asn Glu Leu Leu Leu Ser Asp Tyr Leu Glu Asn Gln Ser Asn  
 420 425 430

Asp Pro Arg Gln Lys Arg Phe Ala Leu Ala His Arg Leu Thr Asp Thr  
 435 440 445

Tyr Phe His Asn Phe Ile Thr His Leu Leu Glu Ala Ala Phe Gln Arg  
 450 455 460

Lys Val Tyr Thr Leu Ile Glu Glu Gly Glu Thr Phe Gly Ala Ser Lys  
 465 470 475 480

Leu Asn Ser Ile Met Lys Glu Val Leu Thr Asp Phe Trp Gly Asp Ala  
 485 490 495

Ile Glu Ile Asp Asp Asp Ala Thr Leu Thr Trp Met Arg Gln Ala His

500                      505                      510  
 Tyr Tyr Met Gly Leu Tyr Ser Tyr Thr Tyr Ser Ala Gly Leu Val Ile  
           515                      520                      525  
 Ser Thr Ala Gly Tyr Leu His Leu Lys His Ser Glu Thr Gly Ala Glu  
           530                      535                      540  
 Asp Trp Leu Asn Leu Leu Lys Ser Gly Gly Ser Lys Thr Pro Leu Glu  
 545                      550                      555                      560  
 Ser Ala Met Ile Ile Gly Ala Asp Ile Ser Thr Asp Lys Pro Leu Arg  
                           565                      570                      575  
 Asp Thr Ile Gln Phe Leu Ser Asp Thr Val Asp Gln Ile Ile Ser Tyr  
                           580                      585                      590  
 Ser Ala Glu Leu Gly Glu  
           595  
  
 <210> 371  
 <211> 190  
 <212> PRT  
 <213> Streptococcus pneumoniae  
  
 <400> 371  
 Met Tyr Met Ser Lys Ala Lys Lys Ile Cys Phe Ile Ile Phe Cys Ile  
 1                      5                      10                      15  
 Leu Ile Leu Thr Ile Phe Leu Pro Val Leu Ile Asp Tyr His Gln Val  
           20                      25                      30  
 Ser Asp Leu Gly Ile His Leu Leu Ser Trp Arg Gln Asn Ser Val Val  
           35                      40                      45  
 Glu Phe Tyr Leu Ala Arg Tyr Val Phe Trp Gly Thr Val Val Leu Ser  
           50                      55                      60  
 Thr Leu Val Leu Leu Ser Ile Leu Val Val Met Phe Tyr Pro Lys Arg  
 65                      70                      75                      80  
 Tyr Leu Glu Ile Gln Leu Glu Thr Lys Asn Asp Thr Leu Lys Leu Lys

85 90 95  
 Asn Ser Ala Ile Glu Gly Phe Val Arg Ser Leu Val Ser Asp His Arg  
 100 105 110  
 Leu Ile Lys Asn Pro Thr Val His Val Asn Leu Arg Lys Asn Lys Cys  
 115 120 125  
 Phe Val His Val Glu Gly Lys Ile Leu Pro Ser Asp Asn Ile Ala Asp  
 130 135 140  
 Arg Cys Gln Ile Ile Gln Asn Glu Ile Thr Asn Gly Leu Lys Gln Phe  
 145 150 155 160  
 Phe Gly Ile Glu Arg Gln Val Lys Leu Glu Val Ala Val Lys Asn Tyr  
 165 170 175  
 Gln Pro Lys Pro Gln Asn Lys Lys Thr Val Ser Arg Val Lys  
 180 185 190  
 <210> 372  
 <211> 219  
 <212> PRT  
 <213> Streptococcus pneumoniae  
 <400> 372  
 Met Ile Asp Phe Tyr Phe Phe Leu Val Gly Ser Ile Leu Ala Ser Phe  
 1 5 10 15  
 Leu Gly Leu Val Ile Asp Arg Phe Pro Glu Gln Ser Ile Ile Ser Ser  
 20 25 30  
 Ala Ser His Cys Asp Ser Cys Gln Thr Pro Leu Arg Pro Leu Asp Leu  
 35 40 45  
 Ile Pro Ile Leu Ser Gln Val Phe Asn Arg Phe Arg Cys Arg Tyr Cys  
 50 55 60  
 Lys Val Arg Tyr Pro Val Trp Tyr Ala Leu Phe Glu Leu Ser Leu Gly  
 65 70 75 80  
 Leu Leu Phe Leu Leu Tyr Ser Trp Gly Trp Leu Ser Leu Gly Gln Val



	85	90	95
Val Leu Ile Thr Ala Gly Leu Thr Leu Gly Ile Tyr Asp Phe His His 100 105 110			
Gln Glu Tyr Pro Leu Leu Val Trp Met Thr Phe Gln Leu Ile Leu Ile 115 120 125			
Ala Ser Ser Gly Trp Asn Leu Val Met Val Ser Phe Leu Ile Leu Gly 130 135 140			
Ile Leu Ala His Phe Ile Asp Ile Arg Met Gly Ala Gly Asp Phe Leu 145 150 155 160			
Phe Leu Ala Ser Cys Ala Leu Val Phe Ser Val Thr Glu Leu Leu Ile 165 170 175			
Leu Ile Gln Phe Ala Ser Ala Thr Gly Ile Leu Ala Phe Leu Leu Gln 180 185 190			
Lys Lys Lys Glu Arg Leu Pro Phe Val Pro Phe Leu Leu Leu Ala Thr 195 200 205			
Cys Leu Ile Ile Phe Gly Lys Leu Leu Leu Val 210 215			
<210> 373			
<211> 383			
<212> PRT			
<213> Streptococcus pneumoniae			
<400> 373			
Met Phe Asn Gly Arg Val Leu Lys Glu Leu Arg Leu Leu Asn Gly Leu 1 5 10 15			
Ser Arg Ala Glu Leu Ala Gln Arg Ile Asn Leu Thr Glu Gln Ala Ile 20 25 30			
Trp Gln Phe Glu Ser Asn Glu Thr Lys Pro Lys Leu Ser Thr Lys Met 35 40 45			
His Leu Ala Asn Gln Phe His Val Asp Leu Thr Tyr Phe Glu Gln Gln			

50		55		60
Glu Glu Ser Ile Arg Phe Asp Ser Ser Val Ile Ala Phe Arg Asn Ala				
65		70		75 80
Asp Leu Ala Thr Arg Lys Thr Ile Asp Ile Gln Thr Met Tyr Leu His				
	85		90	95
Lys Val Asp Ser Leu Ile Asp Tyr Phe Glu Ser Phe Val Ile Ile Pro				
	100		105	110
Asn Ile Ile Ile His Asp Leu Ser Asn Val Val Ser Glu Ser Tyr His				
	115		120	125
Lys Gly Glu Ser Ile Glu Glu Leu Ala Leu Tyr Ala Arg Glu Lys Leu				
	130		135	140
Gly Ile Ser Lys Asp Asn His Asp Leu Leu Tyr Lys Leu Glu Arg Ser				
	145		150	155 160
Gly Ile Tyr Ile Val Glu Arg Leu Ile Asn Gly Gln Ala Asp Ala Tyr				
	165		170	175
Ser Ala Trp Ser Lys Leu Gly Arg Pro Tyr Ile Val Leu Gly Thr Asn				
	180		185	190
Lys Ser Ser Val Arg Arg Asn Phe Asp Leu Ala His Glu Leu Gly His				
	195		200	205
Ile Leu Leu His Lys Tyr Lys Asp Met Asn Glu Asp Gly Asp Arg Leu				
	210		215	220
Glu Gln Glu Ala Asn Tyr Phe Ala Ser Cys Phe Leu Leu Pro Lys Glu				
	225		230	235 240
Glu Phe Leu Val Lys Phe Glu Glu Arg Val Gly Lys Arg Val Ser Asn				
	245		250	255
Pro Asp Ser Tyr Ile Leu Leu Lys Ser Asp Leu Asn Val Ser Ile Gln				
	260		265	270

Ala Leu Glu Tyr Arg Ala Phe Lys Leu Gly Leu Leu Thr Pro Lys Gln  
 275 280 285

His Ser Tyr Phe Tyr Arg Gln Ile Ala Gln Lys Gly Tyr Lys Met Ile  
 290 295 300

Glu Pro Leu Asp Asp Gln Ile Phe Val Lys Lys Pro Ser Lys Val Lys  
 305 310 315 320

Ser Ile Leu Asp Val Val Leu Ser Asn His Leu Val Ser Leu Ala Thr  
 325 330 335

Ile Met Ser Lys Gln Ser Ile Arg Leu Gln Phe Ile Ser Glu Ile Phe  
 340 345 350

Ser Val Glu Met Lys Phe Phe Asp Gln Tyr Gln Glu Asp Arg Arg Thr  
 355 360 365

Asp Arg Phe Asp Asn Ile Ile Pro Leu Tyr Lys Arg Asn Asn Leu  
 370 375 380

<210> 374

<211> 594

<212> PRT

<213> Streptococcus pneumoniae

<400> 374

Met Ala Ser Gly Phe His Leu Gln Ser Glu Arg Asp Phe Met Ser Ile  
 1 5 10 15

Ile Gln Lys Leu Trp Trp Phe Phe Lys Leu Glu Lys Arg Arg Tyr Leu  
 20 25 30

Val Gly Ile Val Ala Leu Ile Leu Val Ser Val Leu Asn Leu Ile Pro  
 35 40 45

Pro Met Val Met Gly Arg Val Ile Asp Ala Ile Thr Ser Gly Gln Leu  
 50 55 60

Thr Gln Gln Asp Leu Leu Leu Ser Leu Phe Tyr Leu Leu Leu Ala Ala  
 65 70 75 80

Phe Gly Met Tyr Tyr Leu Arg Tyr Val Trp Arg Met Tyr Ile Leu Gly  
                     85                    90                    95

Thr Ser Tyr Cys Leu Gly Gln Ile Met Arg Ser Arg Leu Phe Lys His  
                     100                    105                    110

Phe Thr Lys Met Ser Ser Ala Phe Tyr Gln Thr Tyr Arg Thr Gly Asp  
                     115                    120                    125

Leu Met Ala His Ala Thr Asn Asp Ile Asn Ala Leu Thr Arg Leu Ala  
                     130                    135                    140

Gly Gly Gly Val Met Ser Ala Val Asp Ala Ser Ile Thr Ala Leu Val  
                     145                    150                    155                    160

Thr Leu Leu Thr Met Leu Phe Ser Ile Ser Trp Gln Met Thr Leu Val  
                     165                    170                    175

Ala Ile Leu Pro Leu Pro Phe Met Ala Tyr Thr Thr Ser Arg Leu Gly  
                     180                    185                    190

Arg Lys Thr His Lys Ala Phe Gly Glu Ser Gln Ala Ala Phe Ser Glu  
                     195                    200                    205

Leu Asn Asn Lys Val Gln Glu Ser Val Ser Gly Ile Lys Val Thr Lys  
                     210                    215                    220

Ser Phe Gly Tyr Gln Ala Asp Glu Leu Lys Ser Phe Gln Ala Val Asn  
                     225                    230                    235                    240

Glu Leu Thr Phe Gln Lys Asn Leu Gln Thr Met Lys Tyr Asp Ser Leu  
                     245                    250                    255

Phe Asp Pro Met Val Leu Leu Phe Val Gly Ser Ser Tyr Val Leu Thr  
                     260                    265                    270

Leu Leu Val Gly Ser Leu Met Val Gln Glu Gly Gln Ile Thr Val Gly  
                     275                    280                    285

Asn Leu Val Thr Phe Ile Ser Tyr Leu Asp Met Leu Val Trp Pro Leu  
                     290                    295                    300

Leu Ala Ile Gly Phe Leu Phe Asn Thr Thr Gln Arg Gly Lys Val Ser  
 305 310 315 320

Tyr Gln Arg Ile Glu Asn Leu Leu Ser Gln Glu Ser Pro Val Gln Asp  
 325 330 335

Pro Glu Phe Pro Leu Asp Gly Ile Glu Asn Gly Arg Leu Glu Tyr Ala  
 340 345 350

Ile Asp Ser Phe Ala Phe Glu Asn Glu Glu Thr Leu Thr Asp Ile His  
 355 360 365

Phe Ser Leu Ala Lys Gly Gln Thr Leu Gly Leu Val Gly Gln Thr Gly  
 370 375 380

Ser Gly Lys Thr Ser Leu Ile Lys Leu Leu Leu Arg Glu Tyr Asp Val  
 385 390 395 400

Asp Lys Gly Ala Ile Tyr Leu Asn Gly His Asp Ile Arg Asp Tyr Arg  
 405 410 415

Leu Thr Asp Leu Arg Ser Leu Met Gly Tyr Val Pro Gln Asp Gln Phe  
 420 425 430

Leu Phe Ala Thr Ser Ile Leu Asp Asn Ile Arg Phe Gly Asn Pro Asn  
 435 440 445

Leu Pro Leu Ser Ala Val Glu Glu Ala Thr Lys Leu Ala Arg Val Tyr  
 450 455 460

Gln Asp Ile Val Asp Met Pro Gln Gly Phe Asp Thr Leu Ile Gly Glu  
 465 470 475 480

Lys Gly Val Ser Leu Ser Gly Gly Gln Lys Gln Arg Leu Ala Met Ser  
 485 490 495

Arg Ala Met Ile Leu Asp Pro Asp Ile Leu Ile Leu Asp Asp Ser Leu  
 500 505 510

Ser Ala Val Asp Ala Lys Thr Glu Tyr Ala Ile Ile Asp Asn Leu Lys  
 515 520 525

Glu Met Arg Lys Asp Lys Thr Thr Ile Ile Thr Ala His Arg Leu Ser  
 530 535 540

Ala Val Val His Ala Asp Phe Ile Leu Val Leu Gln Asn Gly Gln Ile  
 545 550 555 560

Ile Glu Arg Gly Thr His Glu Asp Leu Leu Ala Leu Asp Gly Trp Tyr  
 565 570 575

Ala Gln Thr Tyr Gln Ser Gln Gln Leu Glu Met Lys Gly Glu Glu Asp  
 580 585 590

Ala Glu

<210> 375

<211> 655

<212> PRT

<213> Streptococcus pneumoniae

<400> 375

Met Gly Lys Phe Glu Gln Glu Ala Lys Asp Leu Leu Gln Ala Ile Gly  
 1 5 10 15

Gly Lys Glu Asn Val Thr Ala Val Thr His Cys Ala Thr Arg Met Arg  
 20 25 30

Phe Val Leu Gly Asp Asp Lys Lys Ala Asn Val Lys Ala Ile Glu Ser  
 35 40 45

Ile Pro Ala Val Lys Gly Thr Phe Thr Asn Ala Gly Gln Phe Gln Val  
 50 55 60

Ile Ile Gly Asn Asp Val Pro Ile Phe Tyr Asn Asp Phe Thr Ala Val  
 65 70 75 80

Ser Gly Ile Glu Gly Val Ser Lys Glu Ala Ala Lys Ser Ala Ala Lys  
 85 90 95

Ser Asn Gln Asn Val Val Gln Gly Val Met Thr Thr Leu Ala Glu Ile  
 100 105 110

Phe Thr Pro Ile Ile Pro Ala Leu Ile Val Gly Gly Leu Ile Leu Gly  
 115 120 125

Phe Arg Asn Val Leu Glu Gly Val His Trp Ser Met Leu Asp Gly Lys  
 130 135 140

Thr Ile Thr Glu Ser Ser Gln Phe Trp Ala Gly Val Asn His Phe Leu  
 145 150 155 160

Trp Leu Pro Gly Glu Ala Ile Phe Gln Phe Leu Pro Val Gly Ile Thr  
 165 170 175

Trp Ser Val Ser Arg Lys Met Gly Thr Ser Gln Ile Leu Gly Ile Val  
 180 185 190

Leu Gly Ile Cys Leu Val Ser Pro Gln Leu Leu Asn Ala Tyr Ala Val  
 195 200 205

Ala Ser Thr Pro Ala Ala Asp Ile Ala Ala Asn Trp Val Trp Asn Phe  
 210 215 220

Gly Tyr Phe Thr Val Asn Arg Ile Gly Tyr Gln Ala Gln Val Ile Pro  
 225 230 235 240

Ala Leu Leu Ala Gly Leu Ser Leu Ser Tyr Leu Glu Ile Phe Trp His  
 245 250 255

Lys His Ile Pro Glu Val Ile Ser Met Ile Phe Val Pro Phe Leu Ser  
 260 265 270

Leu Ile Pro Ala Leu Ile Leu Ala His Thr Val Leu Gly Pro Ile Gly  
 275 280 285

Trp Thr Ile Gly Gln Gly Leu Ser Ser Val Val Leu Ala Gly Leu Thr  
 290 295 300

Gly Pro Val Lys Trp Leu Phe Gly Ala Ile Phe Gly Ala Leu Tyr Ala  
 305 310 315 320

Pro Phe Val Ile Thr Gly Leu His His Met Thr Asn Ala Ile Asp Thr

	325		330		335
Gln Leu Ile	Ala Asp Ala Gly Gly Thr Ala Leu Trp Pro Met Ile Ala				
	340		345		350
Leu Ser Asn Ile Ala Gln Gly Ser Ala Val Phe Ala Tyr Tyr Phe Met					
	355		360		365
His Arg His Asp Glu Arg Glu Ala Gln Val Ser Leu Pro Ala Thr Ile					
	370		375		380
Ser Ala Tyr Leu Gly Val Thr Glu Pro Ala Leu Phe Gly Val Asn Val					
385		390		395	400
Lys Tyr Ile Tyr Pro Phe Val Ala Gly Met Thr Gly Ser Ala Leu Ala					
	405		410		415
Gly Met Leu Ser Val Thr Phe Asn Val Thr Ala Ala Ser Ile Gly Ile					
	420		425		430
Gly Gly Leu Pro Gly Ile Leu Ser Ile Gln Pro Gln Tyr Met Leu Pro					
	435		440		445
Phe Ala Gly Thr Met Leu Val Ala Ile Val Val Pro Met Leu Leu Thr					
	450		455		460
Phe Phe Phe Arg Lys Ala Gly Leu Phe Thr Lys Thr Glu Gly Asp Thr					
465		470		475	480
Asn Leu Gln Ala Glu Phe Val Ala Gln Glu Glu Ala Glu Phe Val Asn					
	485		490		495
His Glu Pro Val Glu Leu Thr Ser Val Glu Ile Ile Ser Pro Leu Thr					
	500		505		510
Gly Gln Val Lys Glu Leu Ser Gln Ala Thr Asp Pro Ile Phe Ala Ser					
	515		520		525
Gly Val Met Gly Gln Gly Leu Val Ile Glu Pro Ser Gln Gly Glu Leu					
	530		535		540



Thr Ser Pro Val Asn Gly Thr Val Thr Val Leu Phe Pro Thr Lys His  
 545 550 555 560

Ala Ile Gly Ile Val Ser Asp Glu Gly Val Glu Leu Leu Ile His Ile  
 565 570 575

Gly Met Asp Thr Val Gly Leu Asp Gly Lys Gly Phe Glu Ser Leu Val  
 580 585 590

Val Gln Gly Asp His Val Thr Val Gly Gln Gln Leu Ile Arg Phe Asp  
 595 600 605

Met Asp Val Ile Lys Ala Ala Gly Leu Val Thr Glu Thr Pro Val Ile  
 610 615 620

Ile Thr Asn Gln Asp Ala Tyr Thr Ala Thr Ile Pro Gly Thr Tyr Pro  
 625 630 635 640

Thr Thr Ile Gln Ala Gly Ala Ser Leu Met Val Ala Thr Arg Ile  
 645 650 655

<210> 376

<211> 175

<212> PRT

<213> Streptococcus pneumoniae

<400> 376

Met Ser Arg Val His Val Gln Ile Met Asn Gln Phe His Arg Lys Ser  
 1 5 10 15

His Glu Tyr Lys Ala Ile Lys Arg Tyr Trp Lys Leu Ile Gln Gln Asp  
 20 25 30

Ser Arg Lys Leu Ser Asp Lys Arg Phe Tyr Arg Pro Thr Phe Arg Met  
 35 40 45

His Leu Thr Asn Lys Glu Ile Leu Asp Lys Ile Leu Ser Tyr Ser Glu  
 50 55 60

Asp Leu Lys His His Tyr Gln Ile Tyr Gln Leu Leu Leu Phe His Phe  
 65 70 75 80

Gln Asn Lys Asp Pro Glu Lys Phe Phe Gly Leu Ile Glu Asp Asn Leu  
                             85                            90                            95

Lys Gln Val His Pro Leu Phe Gln Thr Val Phe Lys Thr Phe Leu Lys  
                             100                            105                            110

Asp Lys Glu Lys Ile Ile Asn Ala Leu Gln Leu His Tyr Ser Asn Ala  
                             115                            120                            125

Lys Leu Glu Ala Thr Asn Asn Leu Ile Lys Leu Ile Lys Arg Asn Ala  
                             130                            135                            140

Phe Gly Phe Arg Asn Phe Glu Asn Phe Lys Lys Arg Ile Phe Ile Ala  
                             145                            150                            155                            160

Leu Asn Ile Lys Lys Glu Arg Thr Lys Phe Val Leu Ser Arg Ala  
                             165                            170                            175

<210> 377

<211> 355

<212> PRT

<213> Streptococcus pneumoniae

<400> 377

Met Thr Lys Glu Lys Asn Val Ile Leu Thr Ala Arg Asp Ile Val Val  
                             1                            5                            10                            15

Glu Phe Asp Val Arg Asp Lys Val Leu Thr Ala Ile Arg Gly Val Ser  
                             20                            25                            30

Leu Glu Leu Val Glu Gly Glu Val Leu Ala Leu Val Gly Glu Ser Gly  
                             35                            40                            45

Ser Gly Lys Ser Val Leu Thr Lys Thr Phe Thr Gly Met Leu Glu Glu  
                             50                            55                            60

Asn Gly Arg Ile Ala Gln Gly Ser Ile Asp Tyr Arg Gly Gln Asp Leu  
                             65                            70                            75                            80

Thr Ala Leu Ser Ser His Lys Asp Trp Glu Gln Ile Arg Gly Ala Lys  
                             85                            90                            95

Ile Ala Thr Ile Phe Gln Asp Pro Met Thr Ser Leu Asp Pro Ile Lys  
 100 105 110

Thr Ile Gly Ser Gln Ile Thr Glu Val Ile Val Lys His Gln Gly Lys  
 115 120 125

Thr Ala Lys Glu Ala Lys Glu Leu Ala Ile Asp Tyr Met Asn Lys Val  
 130 135 140

Gly Ile Pro Asp Ala Asp Arg Arg Phe Asn Glu Tyr Pro Phe Gln Tyr  
 145 150 155 160

Ser Gly Gly Met Arg Gln Arg Ile Val Ile Ala Ile Ala Leu Ala Cys  
 165 170 175

Arg Pro Asp Val Leu Ile Cys Asp Glu Pro Thr Thr Ala Leu Asp Val  
 180 185 190

Thr Ile Gln Ala Gln Ile Ile Asp Leu Leu Lys Ser Leu Gln Asn Glu  
 195 200 205

Tyr His Phe Thr Thr Ile Phe Ile Thr His Asp Leu Gly Val Val Ala  
 210 215 220

Ser Ile Ala Asp Lys Val Ala Val Met Tyr Ala Gly Glu Ile Val Glu  
 225 230 235 240

Tyr Gly Thr Val Glu Glu Val Phe Tyr Asp Pro Arg His Pro Tyr Thr  
 245 250 255

Trp Ser Leu Leu Ser Ser Leu Pro Gln Leu Ala Asp Asp Lys Gly Asp  
 260 265 270

Leu Tyr Ser Ile Pro Gly Thr Pro Pro Ser Leu Tyr Thr Asp Leu Lys  
 275 280 285

Gly Asp Ala Phe Ala Leu Arg Ser Asp Tyr Ala Met Gln Ile Asp Phe  
 290 295 300

Glu Gln Lys Ala Pro Gln Phe Ser Val Ser Glu Thr His Trp Ala Lys  
 305 310 315 320

Thr Trp Leu Leu His Glu Asp Ala Pro Lys Val Glu Lys Pro Ala Val  
 325 330 335

Ile Ala Asn Leu His Asp Lys Ile Arg Glu Lys Met Gly Phe Ala His  
 340 345 350

Leu Ala Asp  
 355

<210> 378

<211> 308

<212> PRT

<213> Streptococcus pneumoniae

<400> 378

Met Ser Thr Ile Asp Lys Glu Lys Phe Gln Phe Val Lys Arg Asp Asp  
 1 5 10 15

Phe Ala Ser Glu Thr Ile Asp Ala Pro Ala Tyr Ser Tyr Trp Lys Ser  
 20 25 30

Val Phe Lys Gln Phe Met Lys Lys Lys Ser Thr Val Val Met Leu Gly  
 35 40 45

Ile Leu Val Ala Ile Ile Leu Ile Ser Phe Ile Tyr Pro Met Phe Ser  
 50 55 60

Lys Phe Asp Phe Asn Asp Val Ser Lys Val Asn Asp Phe Ser Val Arg  
 65 70 75 80

Tyr Ile Lys Pro Asn Ala Glu His Trp Phe Gly Thr Asp Ser Asn Gly  
 85 90 95

Lys Ser Leu Phe Asp Gly Val Trp Phe Gly Ala Arg Asn Ser Ile Leu  
 100 105 110

Ile Ser Val Ile Ala Thr Val Ile Asn Leu Val Ile Gly Val Phe Val  
 115 120 125

Gly Gly Ile Trp Gly Ile Ser Lys Ser Val Asp Arg Val Met Met Glu  
 130 135 140

Val Tyr Asn Val Ile Ser Asn Ile Pro Pro Leu Leu Ile Val Ile Val  
 145 150 155 160

Leu Thr Tyr Ser Ile Gly Ala Gly Phe Trp Asn Leu Ile Phe Ala Met  
 165 170 175

Ser Val Thr Thr Trp Ile Gly Ile Ala Phe Met Ile Arg Val Gln Ile  
 180 185 190

Leu Arg Tyr Arg Asp Leu Glu Tyr Asn Leu Ala Ser Arg Thr Leu Gly  
 195 200 205

Thr Pro Thr Leu Lys Ile Val Ala Lys Asn Ile Met Pro Gln Leu Val  
 210 215 220

Ser Val Ile Val Thr Thr Met Thr Gln Met Leu Pro Ser Phe Ile Ser  
 225 230 235 240

Tyr Glu Ala Phe Leu Ser Phe Phe Gly Leu Gly Leu Pro Ile Thr Val  
 245 250 255

Pro Ser Leu Gly Arg Leu Ile Ser Asp Tyr Ser Gln Asn Val Thr Thr  
 260 265 270

Asn Ala Tyr Leu Phe Trp Ile Pro Leu Thr Thr Leu Val Leu Val Ser  
 275 280 285

Leu Ser Leu Phe Val Val Gly Gln Asn Leu Ala Asp Ala Ser Asp Pro  
 290 295 300

Arg Thr His Arg  
 305

<210> 379

<211> 498

<212> PRT

<213> Streptococcus pneumoniae

<400> 379

Met Lys Lys Tyr Ile Phe Met Arg Val Leu Arg Ser Leu Val Ser Ile  
 1 5 10 15

Phe Leu Val Thr Thr Leu Thr Tyr Thr Ile Ile Tyr Thr Leu Val Pro  
                   20                                  25                                  30

Arg Lys Leu Ile Phe Lys Gln Asp Pro Asn Tyr Asn Lys Ile Ala Thr  
                   35                                  40                                  45

Thr Ala Asp Lys Arg Asp Asn Tyr Glu Asn Thr Val Phe Glu Arg Met  
                   50                                  55                                  60

Gly Tyr Ile Glu Tyr Tyr Asp Thr Lys Glu Leu Gln Glu Lys Ala Ser  
                   65                                  70                                  75                                  80

Ser Met Asp Ser Ser Val Thr Val Glu Ala Asn Ala Thr Asn Lys Ala  
                                   85                                  90                                  95

Ile Tyr Glu Lys Tyr Ile Asn Gln Leu Gly His Gly Trp Thr Leu Gly  
                                   100                                  105                                  110

Glu Phe Thr Glu Ser Gly Gln Phe Tyr Ala Thr Arg Glu Ile Pro Ile  
                   115                                  120                                  125

Phe Glu Arg Val Phe His Phe Tyr Ala Asn Leu Ile Asp Ile Asp His  
                   130                                  135                                  140

Thr Asn Lys Ile Gln Asp Pro Glu Asn Pro Asp Leu Lys Arg Tyr Leu  
                   145                                  150                                  155                                  160

Arg Phe Glu Asn Asp Pro Ala Ile Gly Trp Ser Leu Val Gly Ser Gly  
                                   165                                  170                                  175

Thr Lys His Lys Tyr Leu Leu Tyr Phe Asn Ser Gln Phe Pro Phe Val  
                                   180                                  185                                  190

His Gln Asn Phe Val Asn Leu Asn Leu Gly Asp Ser Tyr Pro Thr Tyr  
                   195                                  200                                  205

Ala Asn Thr Pro Val Leu Gln Val Ile Thr Gln Gly Gln Gly Gln Thr  
                   210                                  215                                  220

Lys Thr Ala Gln Val Gln Phe Pro Thr Gly Lys Lys Thr Ser Ser Val  
                   225                                  230                                  235                                  240

Asn Ile Tyr Ser Arg Thr Tyr Lys Ser Pro Ser Gln Ala Asp Ser Arg  
 245 250 255

Glu Val Ala Ser Tyr Gly Lys Asp Asp Pro Tyr Thr Ala Thr Glu Ser  
 260 265 270

Asn Tyr Gln Tyr Pro Ser Met Ile Val Ser Ser Ala Ile Thr Gly Leu  
 275 280 285

Ile Gly Leu Val Leu Ala Tyr Ala Leu Ala Val Pro Leu Gly Ser Ala  
 290 295 300

Met Ala Arg Phe Lys Asn Thr Trp Ile Asp Ser Leu Ser Thr Gly Ala  
 305 310 315 320

Leu Thr Phe Leu Leu Ala Leu Pro Thr Ile Ala Leu Val Tyr Ile Val  
 325 330 335

Arg Leu Ile Gly Ser Ser Ile Ala Leu Pro Asp Ser Phe Pro Ile Leu  
 340 345 350

Gly Ala Gly Asp Trp Arg Ser Tyr Val Leu Pro Ala Val Ile Leu Gly  
 355 360 365

Leu Leu Gly Ala Pro Gly Thr Ala Ile Trp Ile Arg Arg Tyr Met Ile  
 370 375 380

Asp Leu Gln Ser Gln Asp Phe Val Arg Phe Ala Arg Ala Lys Gly Leu  
 385 390 395 400

Ser Glu Lys Glu Ile Ser Asn Lys His Ile Phe Lys Asn Ala Met Val  
 405 410 415

Pro Leu Val Ser Gly Ile Pro Ala Ala Ile Ile Gly Val Ile Gly Gly  
 420 425 430

Ala Thr Leu Thr Glu Thr Val Phe Ala Phe Pro Gly Met Gly Lys Met  
 435 440 445

Leu Ile Asp Ser Val Lys Ala Ser Asn Asn Ser Met Val Val Gly Leu

450                      455                      460  
 Val Phe Ile Phe Thr Cys Ile Ser Ile Phe Ser Arg Leu Leu Gly Asp  
 465                      470                      475                      480  
 Ile Trp Met Thr Ile Ile Asp Pro Arg Ile Lys Leu Thr Glu Lys Gly  
                     485                      490                      495  
 Gly Lys  
  
 <210> 380  
 <211> 343  
 <212> PRT  
 <213> Streptococcus pneumoniae  
  
 <400> 380  
 Met Gly Phe Leu Leu Met Gly Ala Leu Phe Ile Val Leu Pro Arg Thr  
 1                      5                      10                      15  
 Met Val Ser Ala Lys Arg Ile Asn Gln Val Leu Asp Leu His Ser Ser  
                     20                      25                      30  
 Ile Gln Asn Pro Val Gln Val Gln Leu Thr Asp Glu Asn Phe Lys Gly  
                     35                      40                      45  
 Gln Val Glu Phe Lys Asp Val Thr Phe Arg Tyr Ala Ala Asn Ser Glu  
                     50                      55                      60  
 Ala Val Ile Glu His Val Ser Phe Lys Ala Glu Thr Gly Gln Thr Val  
 65                      70                      75                      80  
 Ala Phe Ile Gly Ser Thr Gly Ser Gly Lys Ser Thr Leu Val Asn Leu  
                     85                      90                      95  
 Ile Pro Arg Phe Tyr Asp Val Ser Ala Gly Glu Ile Leu Val Asp Gly  
                     100                      105                      110  
 Val Asn Val Gln Asp Tyr Asp Phe Ser Ala Thr Ala His Ala Gly Gln  
                     115                      120                      125  
 Lys Val Ala Ile Val Gly Pro Thr Gly Ala Gly Lys Thr Thr Ile Val



130	135	140
Asn Leu Leu Met Lys Phe Tyr Glu Ile Asp Lys Gly Ser Ile Arg Ile 145 150 155 160		
Asp Gly Val Asp Thr Lys Ala Met Thr Arg Ser Glu Val His Asp Ala 165 170 175		
Phe Ser Met Val Leu Gln Asp Thr Trp Leu Phe Glu Gly Thr Ile Arg 180 185 190		
Asp Asn Leu Ile Tyr Asn Gln Ile Gly Ile Ser Asp Glu Arg Met Met 195 200 205		
Glu Ala Ser Lys Ala Val Gly Ile His His Phe Ile Met Thr Leu Pro 210 215 220		
Asp Gly Tyr Asp Thr Ile Leu Asp Asp Thr Val Thr Leu Ser Val Arg 225 230 235 240		
Gln Lys Gln Leu Leu Thr Ile Ala Arg Ala Leu Leu Lys Asp Ala Pro 245 250 255		
Leu Leu Ile Leu Asp Glu Ala Thr Ser Ser Val Asp Thr Arg Thr Glu 260 265 270		
Glu Leu Ile Gln Lys Ala Met Asp Arg Leu Met Glu Gly Arg Thr Ser 275 280 285		
Phe Val Ile Ala His Arg Leu Ser Thr Ile Arg Asn Ala Asp Leu Ile 290 295 300		
Leu Val Met Lys Asp Gly Asn Ile Ile Glu Gln Gly Asn Tyr Glu Glu 305 310 315 320		
Leu Met Ala Gln Gly Gly Phe Tyr Ala Asp Leu Tyr Asn Ser Gln Phe 325 330 335		
Thr Glu Asp Glu Ala Glu Glu 340		

<210> 381  
 <211> 273  
 <212> PRT  
 <213> Streptococcus pneumoniae

<400> 381

Met Ile Leu Leu Ala Ile Leu Phe Thr Cys Phe Ser Val Tyr Leu Glu  
 1 5 10 15

Leu Glu Val Pro Thr Tyr Ile Ser Lys Ile Thr Asp Leu Leu Gly Ser  
 20 25 30

Gln Glu Thr Asn Leu Asp Glu Leu Trp Gln Ser Ala Ser Met Met Met  
 35 40 45

Gly Met Ser Phe Leu Ala Phe Leu Ser Val Val Ala Val Gly Phe Phe  
 50 55 60

Ala Ser Arg Val Ala Ala Ser Tyr Thr Ser Arg Leu Arg Ser Asp Ile  
 65 70 75 80

Phe Asn Arg Val Leu Asp Tyr Ser Gln Thr Glu Ile Lys Lys Phe Ser  
 85 90 95

Ile Pro Ser Leu Leu Thr Arg Thr Thr Asn Asp Ile Thr Gln Val Gln  
 100 105 110

Met Leu Ile Thr Met Gly Leu Gln Val Val Thr Arg Gly Ser Ile Met  
 115 120 125

Ala Ile Trp Ala Ile Gly Lys Ile Leu Gly His Ser Glu Tyr Trp Leu  
 130 135 140

Trp Ala Val Leu Val Ala Val Ile Ile Asn Val Leu Met Thr Thr Val  
 145 150 155 160

Leu Met Thr Leu Ala Phe Pro Lys Gln Ser Leu Ile Gln Gly Leu Thr  
 165 170 175

Asp Lys Leu Asn Ser Ile Thr Arg Glu Ser Leu Thr Gly Ile Arg Val  
 180 185 190

Val Arg Ala Tyr Asn Ala Glu Asp Tyr Gln Asn Glu Lys Phe Ala Ala  
 195 200 205

Val Asn Asp Glu Leu Thr Arg Leu Asn Leu Phe Val Asn Arg Leu Met  
 210 215 220

Ala Ile Leu Asn Pro Ile Met Met Gly Ile Ser Ser Gly Leu Ser Val  
 225 230 235 240

Ala Ile Tyr Trp Ile Gly Ala Tyr Val Ile Asn Asp Ala Ala Pro Ile  
 245 250 255

Ala Arg Leu Pro Leu Phe Ser Asp Met Ile Val Phe Met Ser Tyr Ala  
 260 265 270

Met

<210> 382  
 <211> 456  
 <212> PRT  
 <213> Streptococcus pneumoniae

<400> 382

Met Asn Lys Lys Arg Thr Val Asp Leu Ile His Gly Pro Ile Leu Pro  
 1 5 10 15

Ser Leu Leu Ser Phe Thr Phe Pro Ile Leu Leu Ser Asn Ile Phe Gln  
 20 25 30

Gln Leu Tyr Asn Thr Ala Asp Val Leu Ile Val Gly Arg Phe Leu Gly  
 35 40 45

Gln Glu Ser Leu Ala Ala Val Gly Ala Thr Thr Ala Ile Phe Asp Leu  
 50 55 60

Ile Val Gly Phe Thr Leu Gly Val Gly Asn Gly Met Gly Ile Val Ile  
 65 70 75 80

Ala Arg Tyr Tyr Gly Ala Arg Asn Phe Thr Lys Ile Lys Glu Ala Val  
 85 90 95

Ala Ala Thr Trp Ile Leu Gly Ala Leu Leu Ser Ile Leu Val Met Leu  
 100 105 110

Leu Gly Phe Leu Gly Leu Tyr Pro Leu Leu Gln Tyr Leu Asp Thr Pro  
 115 120 125

Ala Glu Ile Leu Pro Gln Ser Tyr Gln Tyr Ile Ser Met Ile Val Thr  
 130 135 140

Cys Val Gly Val Ser Phe Ala Tyr Asn Leu Phe Ala Gly Leu Leu Arg  
 145 150 155 160

Ser Ile Gly Asp Ser Leu Ala Ala Leu Gly Phe Leu Ile Phe Ser Ala  
 165 170 175

Leu Val Asn Val Val Leu Asp Leu Tyr Phe Ile Thr Gln Leu His Leu  
 180 185 190

Gly Val Gln Ser Ala Gly Leu Ala Thr Ile Ile Ser Gln Gly Leu Ser  
 195 200 205

Ala Val Leu Cys Phe Tyr Tyr Ile Arg Lys Ser Val Pro Glu Leu Leu  
 210 215 220

Pro Gln Phe Lys His Phe Lys Trp Asp Lys Ser Leu Tyr Ala Asp Leu  
 225 230 235 240

Leu Glu Gln Gly Leu Ala Met Gly Leu Met Ser Ser Ile Val Ser Ile  
 245 250 255

Gly Ser Val Ile Leu Gln Phe Ser Val Asn Thr Phe Gly Ala Val Ile  
 260 265 270

Ile Ser Ala Gln Thr Ala Ala Arg Arg Ile Met Thr Phe Ala Leu Leu  
 275 280 285

Pro Met Thr Ala Ile Ser Ala Ser Met Thr Thr Phe Ala Ser Gln Asn  
 290 295 300

Leu Gly Ala Lys Arg Pro Asp Arg Ile Val Gln Gly Leu Arg Ile Gly  
 305 310 315 320



Ala Gly Val Asn Tyr Leu Tyr Thr Arg Lys Gln Glu Val His Ser Val  
 50 55 60

Leu Ala Ser Lys Lys Ser Val Lys Leu Phe Tyr Ser Met Leu Leu Leu  
 65 70 75 80

Ile Asn Leu Leu Gly Ala Val Leu Val Leu Ser Asp Asn Leu Phe Ile  
 85 90 95

Lys Asn Thr Leu Gln Gln Glu Leu Val Asp Phe Leu Leu Pro Ser Phe  
 100 105 110

Phe Phe Leu Phe Gly Leu Asp Leu Leu Ile Phe Leu Pro Leu Lys Lys  
 115 120 125

Tyr Val Arg Asp Phe Leu Ala Met Leu Asp Arg Lys Lys Thr Val Leu  
 130 135 140

Val Thr Ile Leu Ala Thr Leu Leu Phe Leu Arg Asn Pro Met Thr Ile  
 145 150 155 160

Val Ser Leu Leu Ile Tyr Ile Gly Leu Gly Leu Phe Phe Ala Ala Tyr  
 165 170 175

Leu Val Pro Asn Ser Val Lys Lys Glu Val Ser Phe Tyr Gly His Ile  
 180 185 190

Phe Arg Asp Leu Val Leu Val Ile Val Thr Leu Ile Phe Phe  
 195 200 205

<210> 384

<211> 702

<212> PRT

<213> Streptococcus pneumoniae

<400> 384

Met Lys Ile Pro Met Ile Tyr Gln Met Glu Asn Ser Glu Cys Gly Leu  
 1 5 10 15

Ala Cys Cys Ala Met Ile Leu Asn Tyr Phe Lys Tyr Glu Ile Ser Leu  
 20 25 30

Asn Glu Leu Arg Glu Ile Tyr Pro Ser Ser Arg Ser Gly Tyr Ser Leu  
 35 40 45  
 Leu Ser Ile Ser Lys Val Leu Gly Asp Phe Asn Ile Ser Ser His Ala  
 50 55 60  
 Phe Lys Ala Ser Val Arg Asp Leu Lys Pro Leu Ser Phe Pro Leu Ile  
 65 70 75 80  
 Cys Phe Trp Glu Ser Ser His Phe Ile Ile Leu Glu Lys Ile Ser Lys  
 85 90 95  
 Asn Lys Phe Tyr Ile Leu Asp Pro Ala Lys Gly Arg Gln Arg Met Ser  
 100 105 110  
 Ile Ser Glu Phe Glu Arg His Tyr Ser Asn Ile Ile Leu Thr Phe Lys  
 115 120 125  
 Lys Leu Asp Ser Phe Met Ser Arg Lys Asp Asn Lys Lys Ser Pro Val  
 130 135 140  
 Leu Lys Tyr Phe Phe Lys Tyr Arg Asn Lys Leu Gly Ile Leu Phe Phe  
 145 150 155 160  
 Val Thr Ala Leu Leu Tyr Val Ile Gln Ser Leu Val Pro Ile Ala Asn  
 165 170 175  
 Arg Tyr Ile Ile Asp Thr Asn Phe Lys Asp Asp Ser Tyr Ser Ser Arg  
 180 185 190  
 Met Leu Phe Thr Ile Leu Phe Ile Phe Thr Val Ser Phe Ser Leu Met  
 195 200 205  
 Tyr Leu Leu Arg Gln Ile Tyr Val Ala Ser Leu Lys Tyr Ile Met Asp  
 210 215 220  
 Lys Glu Ile Ser Tyr Asp Phe Met Lys His Leu Ile Tyr Leu Pro Tyr  
 225 230 235 240  
 Ser Phe Tyr Glu Lys Arg Thr Leu Gly Asp Ile Leu Phe Arg Ala Asn  
 245 250 255

Ser Ile Val Tyr Ile Arg Glu Ile Leu Ser Asn Asn Phe Ile Ala Ala  
 260 265 270

Ile Leu Asp Leu Leu Met Ile Val Val Tyr Ala Val Val Leu Phe Ser  
 275 280 285

Phe Ser Lys Tyr Met Val Ile Phe Leu Ile Ser Leu Ser Leu Ala Leu  
 290 295 300

Ser Ile Val Met Tyr Pro Ile Ile Lys Ile Ser Lys Asn Leu Ile Asp  
 305 310 315 320

Lys Asn Ile Lys Glu Lys Val Asn Val Gln Asn Ile Thr Ser Glu Val  
 325 330 335

Ile Ser Lys Asn Ser Asp Ile Lys Leu Thr Gly Glu Glu Glu Phe Trp  
 340 345 350

Ile Asn Lys Trp Asp Asn Phe Asn Thr Lys Gln Leu Ile Ile Gly Arg  
 355 360 365

Lys Leu Asp Ile His Leu Ser Ile Val Ser Ser Ile Thr Asn Val Leu  
 370 375 380

Gln Ile Ile Leu Pro Val Leu Thr Leu Ile Val Gly Val Asn Ile Lys  
 385 390 395 400

Thr Phe Glu Gln Leu Thr Leu Gly Gln Ile Val Ala Ile Ser Thr Val  
 405 410 415

Ser Pro Tyr Phe Ile Ser Pro Ile Ile Ser Leu Ser Asp Asn Tyr Ile  
 420 425 430

Gln Leu Met Leu Leu Lys Gly Tyr Phe Leu Arg Ile Glu Asp Val Phe  
 435 440 445

Asn Thr Lys Ser Glu Leu Ile Pro Glu Arg Val Ser Gln Asp Ile Lys  
 450 455 460

Phe Asp Lys Lys Ile Glu Leu Lys Asp Ile Trp Tyr Lys Tyr Gly Leu



465		470		475		480									
Phe	Asp	Asp	Tyr	Val	Leu	Lys	Gly	Ile	Asn	Val	Thr	Ile	Lys	Lys	Gly
				485					490					495	
Glu	Thr	Val	Ala	Ile	Val	Gly	Glu	Ser	Gly	Ser	Gly	Lys	Ser	Thr	Leu
			500					505					510		
Ala	Lys	Ile	Leu	Leu	Gly	Leu	Leu	Glu	Pro	Asn	Ile	Gly	Ser	Ile	Glu
		515					520					525			
Val	Asp	Gly	Val	Glu	Lys	Glu	Glu	Ile	Gly	Gln	Thr	Leu	Tyr	Arg	Lys
	530					535					540				
Ile	Phe	Gly	Ala	Val	Leu	Gln	Asn	Ser	Thr	Leu	Ser	Tyr	Gly	Thr	Leu
545					550					555					560
Arg	Glu	Asn	Leu	Thr	Phe	Gly	His	Phe	Val	Ser	Asp	Glu	Glu	Leu	Met
				565					570						575
Thr	Asn	Leu	Asn	Ser	Ile	Gly	Leu	Ser	Asn	Val	Val	Lys	Ser	Leu	Pro
		580						585					590		
Leu	Gly	Leu	Glu	Thr	Ile	Ile	Ala	Glu	Glu	Gly	Asn	Asn	Phe	Ser	Gly
		595					600					605			
Gly	Gln	Gln	Gln	Met	Ile	Leu	Leu	Ala	Arg	Cys	Leu	Leu	Ser	Lys	Pro
	610					615					620				
Ser	Val	Val	Val	Leu	Asp	Glu	Ala	Thr	Ser	Ser	Leu	Asp	Asn	Leu	Ser
625					630					635					640
Gln	Gln	Ile	Thr	Thr	Ser	Tyr	Leu	Ser	Glu	Ile	Gly	Thr	Thr	Lys	Ile
				645					650					655	
Leu	Ile	Ala	His	Arg	Leu	Asp	Thr	Ile	Lys	Ser	Ala	Asp	Lys	Ile	Leu
			660					665					670		
Val	Met	His	Asn	Gly	Glu	Ile	Val	Glu	Ile	Gly	Thr	His	Arg	Glu	Leu
		675					680					685			

Leu Glu Leu Gly Gly Ile Tyr Lys Gln Leu Tyr Ser Asn Asn  
 690 695 700

<210> 385  
 <211> 103  
 <212> PRT  
 <213> Streptococcus pneumoniae  
 <400> 385

Met Leu Asn Ile Pro Asn Val Leu Arg Tyr Asp Leu Asn Met Leu Gln  
 1 5 10 15

Leu Glu Tyr Lys Asn Glu Gln Ser Trp Asp Ser Phe Ile Asp Asn Val  
 20 25 30

Asn Leu Ile Glu Leu Glu Glu Arg Ile Gln Thr Thr Ile Gly Ile Lys  
 35 40 45

Gln Ile Asn Thr His Asn Ile Ile Thr Ile Ala Arg Glu Gly Tyr Ser  
 50 55 60

Gln Asn Tyr Leu Pro Asn Thr Ser Glu Asn Thr Tyr Asn Ser Leu Gln  
 65 70 75 80

Val Ser Leu Val Gly Val Leu Leu Leu Phe Ile Ser Met Val Asn Ile  
 85 90 95

Leu Trp Ala Lys Lys Ser Lys  
 100

<210> 386  
 <211> 210  
 <212> PRT  
 <213> Streptococcus pneumoniae

<400> 386

Met Ile Glu Leu Lys Gln Val Ser Lys Ser Phe Gly Glu Arg Glu Leu  
 1 5 10 15

Phe Ser Asn Leu Ser Met Thr Phe Glu Ala Gly Lys Val Tyr Ala Leu  
 20 25 30

Ile Gly Ser Ser Gly Ser Gly Lys Thr Thr Leu Met Asn Met Ile Gly

35                                      40                                      45  
 Lys Leu Glu Pro Tyr Asp Gly Thr Ile Phe Tyr Arg Gly Lys Asp Leu  
     50                                      55                                      60  
 Ala Asn Tyr Lys Ser Ser Asp Phe Phe Arg His Glu Leu Gly Tyr Leu  
     65                                      70                                      75                                      80  
 Phe Gln Asn Phe Gly Leu Ile Glu Asn Gln Ser Ile Glu Glu Asn Leu  
                                     85                                      90                                      95  
 Lys Leu Gly Leu Ile Gly Gln Lys Leu Ser Arg Ser Glu Gln Arg Leu  
                                     100                                      105                                      110  
 Arg Gln Lys Gln Ala Leu Glu Gln Val Gly Leu Val Tyr Leu Asp Leu  
                                     115                                      120                                      125  
 Asp Lys Arg Ile Phe Glu Leu Ser Gly Gly Glu Ser Gln Arg Val Ala  
     130                                      135                                      140  
 Leu Ala Lys Ile Ile Leu Lys Asn Pro Pro Phe Ile Leu Ala Asp Glu  
     145                                      150                                      155                                      160  
 Pro Thr Ala Ser Ile Asp Pro Ala Thr Ser Gln Leu Ile Met Glu Ile  
                                     165                                      170                                      175  
 Leu Leu Ser Leu Arg Asp Asp Asn Arg Leu Ile Ile Ile Ala Thr His  
                                     180                                      185                                      190  
 Asn Pro Ala Ile Trp Glu Met Ala Asp Glu Val Phe Thr Met Asp His  
                                     195                                      200                                      205  
 Leu Lys  
     210  
 <210> 387  
 <211> 345  
 <212> PRT  
 <213> Streptococcus pneumoniae  
 <400> 387  
 Met Lys Lys Lys Ile Arg Trp Pro Leu Tyr Val Ile Ala Ala Leu Ile

1	5	10	15
Val Thr Phe	Leu Ala Phe	Val Val Pro Leu Pro Tyr Tyr	Ile Glu Val
	20	25	30
Pro Gly Gly	Ser Glu Asp Ile	Arg Gln Val Leu Lys Val	Asn Asp Thr
	35	40	45
Glu Asp Lys	Glu Ala Gly Ala Tyr	Gln Phe Val Thr Val Gly Val Gln	
	50	55	60
His Ala Thr	Leu Ala His Met Ile Tyr Ala Trp	Leu Thr Pro Phe Thr	
	65	70	75
Asp Ile Arg	Ser Ala Gln Glu Thr Thr Gly Gly	Ser Ser Asp Val Glu	
	85	90	95
Phe Met Arg	Ile Asn Gln Phe Tyr Met Gln Thr Ser Gln	Asn Met Ala	
	100	105	110
Lys Tyr Gln	Gly Leu Lys Thr Ala Gly Lys Asp Ile Glu Leu Lys Tyr		
	115	120	125
Phe Gly Val	Tyr Val Leu Asn Val Thr Asp Asn Ser Thr Phe Lys Gly		
	130	135	140
Ile Leu Asn	Ile Ser Asp Thr Val Thr Ala Val Asn Asp Gln Thr Phe		
	145	150	155
Asp Ser Ser	Lys Asp Leu Ile Asp Tyr Val Ser Ser Gln Lys Leu Gly		
	165	170	175
Asp Ser Val	Lys Val Thr Tyr Glu Glu Asp Gly Gln Thr Lys Ser Ala		
	180	185	190
Glu Gly Lys	Ile Ile Thr Leu Glu Asn Gly Lys Asn Gly Ile Gly Ile		
	195	200	205
Gly Leu Ile	Asp Arg Thr Glu Val Ile Ser Asn Val Pro Ile Ser Phe		
	210	215	220

Ser Thr Ala Gly Ile Gly Gly Pro Ser Ala Gly Leu Met Phe Ser Leu  
225 230 235 240

Ala Ile Tyr Thr Gln Ile Ala His Pro Asp Leu Arg Asn Gly Arg Ile  
245 250 255

Val Ala Gly Thr Gly Thr Ile Asp Arg Asp Gly Asn Val Gly Asp Ile  
260 265 270

Gly Gly Ile Asp Lys Lys Val Val Ala Ser Ala Arg Ala Gly Ala Ala  
275 280 285

Ile Phe Phe Ala Pro Asp Asn Pro Val Ser Glu Glu Glu Gln Lys Ala  
290 295 300

His Pro Asp Ala Lys Asn Asn Tyr Gln Thr Ala Leu Glu Ala Ala Lys  
305 310 315 320

Thr Ile Lys Thr Asp Met Lys Ile Val Pro Val Lys Thr Leu Gln Asp  
325 330 335

Ala Ile Asp Tyr Leu Lys Asn Asn Pro  
340 345

<210> 388

<211> 308

<212> PRT

<213> Streptococcus pneumoniae

<400> 388

Met Lys Ser Ile Lys Arg Phe Ala Leu Ser Ala Met Gly Val Ala Met  
1 5 10 15

Leu Leu Val Leu Thr Gly Cys Val Asn Val Asp Lys Thr Thr Gly Gln  
20 25 30

Pro Thr Gly Phe Ile Trp Asn Thr Ile Gly Ala Pro Met Ala Glu Ala  
35 40 45

Ile Lys Tyr Phe Ala Thr Asp Lys Gly Leu Gly Phe Gly Val Ala Ile  
50 55 60

Ile	Ile	Val	Thr	Ile	Ile	Val	Arg	Leu	Ile	Ile	Leu	Pro	Leu	Gly	Ile	65	70	75	80
Tyr	Gln	Ser	Trp	Lys	Ala	Thr	Leu	His	Ser	Glu	Lys	Met	Asn	Ala	Leu	85	90	95	
Lys	His	Val	Leu	Glu	Pro	His	Gln	Thr	Arg	Leu	Lys	Glu	Ala	Thr	Thr	100	105	110	
Gln	Glu	Glu	Lys	Leu	Glu	Ala	Gln	Gln	Ala	Leu	Phe	Ala	Ala	Gln	Lys	115	120	125	
Glu	His	Gly	Ile	Ser	Met	Phe	Gly	Gly	Val	Gly	Cys	Phe	Pro	Ile	Leu	130	135	140	
Leu	Gln	Met	Pro	Phe	Phe	Ser	Ala	Ile	Tyr	Phe	Ala	Ala	Gln	His	Thr	145	150	155	160
Glu	Gly	Val	Ala	Gln	Ala	Ser	Tyr	Leu	Gly	Ile	Pro	Leu	Gly	Ser	Pro	165	170	175	
Ser	Met	Ile	Leu	Val	Ala	Cys	Ala	Gly	Val	Leu	Tyr	Tyr	Leu	Gln	Ser	180	185	190	
Leu	Leu	Ser	Leu	His	Gly	Val	Glu	Asp	Glu	Met	Gln	Arg	Glu	Gln	Ile	195	200	205	
Lys	Lys	Met	Ile	Tyr	Met	Ser	Pro	Leu	Met	Ile	Val	Val	Phe	Ser	Leu	210	215	220	
Phe	Ser	Pro	Ala	Ser	Val	Thr	Leu	Tyr	Trp	Val	Val	Gly	Gly	Phe	Met	225	230	235	240
Met	Ile	Leu	Gln	Gln	Phe	Ile	Val	Asn	Tyr	Ile	Val	Arg	Pro	Lys	Leu	245	250	255	
Arg	Lys	Lys	Val	Arg	Glu	Glu	Leu	Ala	Lys	Asn	Pro	Pro	Lys	Ala	Ser	260	265	270	
Ala	Phe	Ser	Lys	Pro	Ser	Gly	Arg	Lys	Asp	Val	Thr	Pro	Glu	Gln	Pro	275	280	285	

Thr Ala Ile Thr Ser Lys Lys Lys His Lys Asn Arg Asn Ala Gly Lys  
 290 295 300

Gln Arg Ser Arg  
 305

<210> 389  
 <211> 213  
 <212> PRT  
 <213> Streptococcus pneumoniae

<400> 389

Met Ile Asp Ile Gln Gly Leu Glu Lys Lys Phe Asn Asp Arg Ala Ile  
 1 5 10 15

Phe Ser Gly Leu Asn Leu Lys Leu Glu Lys Gly Lys Val Tyr Ala Leu  
 20 25 30

Ile Gly Lys Ser Gly Ser Gly Lys Thr Thr Leu Leu Asn Ile Leu Gly  
 35 40 45

Lys Leu Glu Lys Ile Asp Gly Gly Arg Val Leu Tyr Gln Gly Lys Asp  
 50 55 60

Leu Lys Thr Ile Pro Thr Arg Glu Tyr Phe Arg Asp Gln Met Gly Tyr  
 65 70 75 80

Leu Phe Gln Asn Phe Gly Leu Leu Glu Asn Gln Ser Ile Lys Glu Asn  
 85 90 95

Leu Asp Leu Gly Phe Val Gly Gln Lys Ile Ser Lys Val Glu Arg Leu  
 100 105 110

Glu Arg Gln Val Gly Ala Leu Glu Lys Val Asn Leu Gly Tyr Leu Asp  
 115 120 125

Leu Glu Gln Lys Ile Tyr Thr Leu Ser Gly Gly Glu Ala Gln Arg Val  
 130 135 140

Ala Leu Ala Lys Thr Ile Leu Lys Asn Pro Pro Leu Ile Leu Ala Asp  
 145 150 155 160

Glu Pro Thr Ala Ala Leu Asp Pro Glu Asn Ser Glu Glu Val Met Asn  
 165 170 175

Leu Leu Val Asp Leu Lys Asp Glu Asn Arg Ile Ile Ile Ile Ala Thr  
 180 185 190

His Asn Pro Leu Val Trp Asn Lys Ala Asp Glu Ile Ile Asp Met Arg  
 195 200 205

Lys Leu Ala His Val  
 210

<210> 390

<211> 680

<212> PRT

<213> Streptococcus pneumoniae

<400> 390

Met Glu Glu Met Met Lys Arg Leu Phe Ile Leu Ile Ser Met Val Leu  
 1 5 10 15

Val Ser Leu Tyr Met Val Ile Thr Ser Val Asp His Arg Glu Glu Ile  
 20 25 30

Leu Phe Gly Asn Tyr Pro Ser Val Asp Val Thr Gly Met Met Ile Asn  
 35 40 45

Gln Pro Val Ala Ser Arg Glu Glu Val Thr Glu Ala Leu Ser His Leu  
 50 55 60

Ala Val Glu His Asn Ser Leu Ile Ala Arg Arg Ile Val Glu Pro Asn  
 65 70 75 80

Glu Ala Gly Glu Thr Arg Phe Thr Tyr Ala Thr Tyr Gly Glu Gly Lys  
 85 90 95

Leu Pro Glu Gly Leu Thr Ile Ser Ser Lys Glu Ser Ala Glu Thr Ser  
 100 105 110

Asp Leu Leu Gly Ser Tyr Leu Ile Val Ser Gly Ser Leu Asp Gly Val  
 115 120 125



Ser Leu Gln Thr Thr Leu Lys Glu Leu Gly Tyr Gln Gly Phe Val Ser  
 130 135 140

Asn Gly Glu Asp Pro Phe Ser Ile Val Leu Leu Leu Thr Ala Thr Pro  
 145 150 155 160

Met Val Leu Leu Ser Leu Ala Ile Phe Leu Leu Thr Phe Met Ser Leu  
 165 170 175

Thr Leu Ile Tyr Arg Ile Lys Ser Leu Arg Gln Ala Gly Ile Arg Leu  
 180 185 190

Ile Ala Gly Glu Ser Leu Phe Gly Val Ala Leu Arg Pro Val Leu Glu  
 195 200 205

Asp Val Arg Gln Leu Ile Cys Ser Val Leu Val Ser Ser Leu Leu Gly  
 210 215 220

Leu Gly Ile Leu Trp Tyr Gln Gly Ala Leu Phe Met Ala Thr Val Gln  
 225 230 235 240

Leu Val Ile Ile Ala Leu Leu Leu Tyr Gly Leu Thr Leu Ala Gly Ile  
 245 250 255

Ser Thr Leu Leu Ser Val Val Tyr Leu Leu Gly Leu Gln Glu Asn Ser  
 260 265 270

Leu Val Asp Leu Leu Lys Gly Lys Leu Pro Leu Lys Arg Met Met Thr  
 275 280 285

Leu Met Met Val Gly Gln Leu Leu Ala Val Leu Val Val Gly Ser Ser  
 290 295 300

Ala Thr Ala Leu Leu Pro His Tyr Arg Glu Met Gln Glu Met Glu Arg  
 305 310 315 320

Ala Ser Asn Lys Trp Ser Gln Ser Ser Asp Arg Tyr Arg Leu Ser Phe  
 325 330 335

Gly Trp Ser Ser Ala Phe Ala Asp Glu Glu Gly Thr Arg Lys Asp Asn  
 340 345 350

Arg Glu Trp Gln Thr Phe Thr Glu Glu Arg Leu Ala Asn Thr Asp Ser  
 355 360 365

Phe Tyr Ile Met Ser Asn Val Asp Asn Phe Ser Asp Gly Ala Glu Val  
 370 375 380

Asp Leu Asp Gly Asn Arg Leu Ser Asp Tyr Thr Pro Ser Gly Asn Val  
 385 390 395 400

Ile Tyr Val Ser Pro Arg Tyr Leu Ile Glu Glu Lys Ile Thr Val Ser  
 405 410 415

Ser Glu Phe Met Asp Lys Met Gln Asn Leu Ser Glu Gly Glu Phe Gly  
 420 425 430

Leu Ile Leu Pro Glu Ser Leu Arg Glu Gln Ser Val Tyr Tyr Gln Gly  
 435 440 445

Leu Phe Thr Asp Tyr Leu Gln Asn Phe Ser Ser Glu Ser Val Glu Val  
 450 455 460

Thr Ser Gln Lys His Tyr Leu Pro Gln Val Arg Leu Ala Phe Thr Glu  
 465 470 475 480

Thr Gly Gln Glu Arg Phe Leu Tyr Asn Asp Gly Tyr Lys Thr Thr Arg  
 485 490 495

Gln Tyr Leu Lys Asp Pro Ile Ile Val Val Leu Thr Pro Gln Ala Thr  
 500 505 510

Gly Thr Arg Pro Val Ala Gly Met Leu Trp Gly Thr Thr Ala Asn Ser  
 515 520 525

Ala Leu Lys Leu Asp Arg Tyr Gly Asp Ser Ile Thr Ala Leu Lys Glu  
 530 535 540

Lys Gly Leu Tyr His Lys Val Ser Tyr Leu Val Lys Ser Gln Leu Phe  
 545 550 555 560

Phe Ala Lys Val Leu Asn Asp Lys Arg Val Glu Phe Tyr Ser Leu Leu

565                                      570                                      575  
 Ile Gly Thr Ile Leu Thr Leu Ser Thr Ala Ile Leu Leu Phe Asp Ser  
    580                                      585                                      590  
 Met Asn Leu Leu Tyr Phe Glu Gln Phe Arg Arg Glu Leu Met Ile Lys  
    595                                      600                                      605  
 Arg Leu Ala Gly Met Thr Ile Tyr Glu Leu His Gly Lys Tyr Leu Leu  
    610                                      615                                      620  
 Ala Gln Gly Gly Val Leu Leu Leu Gly Leu Val Leu Ser Ser Ile Leu  
    625                                      630                                      635                                      640  
 Thr Arg Asp Gly Leu Ile Ser Ala Leu Val Val Ala Leu Phe Thr Leu  
    645                                      650                                      655  
 Asn Ala Leu Leu Ile Leu Val Arg Gln Asp Lys Lys Glu Glu Ala Gly  
    660                                      665                                      670  
 Ser Met Ala Val Leu Lys Gly Lys  
    675                                      680  
  
 <210> 391  
 <211> 294  
 <212> PRT  
 <213> Streptococcus pneumoniae  
  
 <400> 391  
  
 Met Asn Met Ile Lys Val Glu Ser Leu Asn Lys Asn Ile Lys Gly Lys  
 1                                      5                                      10                                      15  
  
 Ala Ile Leu Lys Gly Ile Ser Phe Glu Val Ala Glu Gly Glu Cys Val  
    20                                      25                                      30  
  
 Ala Leu Ile Gly Pro Asn Gly Ala Gly Lys Thr Thr Leu Leu Asp Cys  
    35                                      40                                      45  
  
 Leu Leu Gly Asp Lys Leu Val Thr Ser Gly Gln Val Ser Ile Gln Gly  
    50                                      55                                      60  
  
 Leu Ser Val Thr Ser Ser Gln Leu Asp Tyr Ile Arg Gly Tyr Leu Pro

65					70						75				80
Gln	Glu	Asn	Val	Ile	Val	Gln	Lys	Leu	Lys	Val	Lys	Glu	Leu	Ile	Ala
				85					90					95	
Phe	Phe	Gln	Arg	Ile	Tyr	Pro	Asn	Ser	Leu	Ser	Asp	Gln	Glu	Ile	Asp
			100					105						110	
Gln	Leu	Leu	Gln	Phe	Asp	Gln	Gln	Gln	Lys	Glu	Gln	Phe	Ala	Glu	Lys
		115						120					125		
Leu	Ser	Gly	Gly	Gln	Lys	Arg	Leu	Phe	Ser	Phe	Val	Leu	Thr	Leu	Ile
	130					135					140				
Gly	Arg	Pro	Lys	Leu	Val	Phe	Leu	Asp	Glu	Pro	Thr	Ala	Ala	Met	Asp
145					150					155					160
Thr	Ser	Thr	Arg	Gln	Arg	Phe	Trp	Glu	Ile	Val	Arg	Asp	Leu	Lys	Ala
				165					170					175	
Gln	Gly	Val	Thr	Ile	Leu	Tyr	Ser	Ser	His	Tyr	Ile	Glu	Glu	Val	Glu
			180					185					190		
His	Thr	Ala	Asp	Arg	Ile	Leu	Val	Leu	Asn	Lys	Gly	Glu	Leu	Ile	Arg
		195					200					205			
Asp	Thr	Thr	Pro	Leu	Ala	Met	Arg	Ser	Glu	Gly	Ile	Glu	Lys	His	Phe
	210					215					220				
Ile	Leu	Pro	Leu	Ala	Tyr	Lys	Glu	Val	Ile	Glu	Gln	Ser	Asn	Leu	Val
225					230					235					240
Glu	Asn	Trp	Ser	Gln	Lys	Gln	Asp	Ala	Leu	Gln	Val	Val	Thr	Arg	Glu
				245					250					255	
Ala	Asp	Ala	Phe	Trp	Glu	Leu	Leu	Val	Gln	Ala	Gly	Cys	Gly	Ile	Gln
			260					265					270		
Glu	Ile	Glu	Val	Asn	Asn	Arg	Ser	Leu	Leu	Asp	Thr	Ile	Phe	Glu	Glu
		275					280					285			

Thr Gln Lys Gly Asp Asn  
290

<210> 392  
<211> 431  
<212> PRT  
<213> Streptococcus pneumoniae  
  
<400> 392

Met Lys Asn Ser Lys Phe Ile Asp Gln Phe Ala Thr Phe Ala Gly Lys  
1 5 10 15

Leu Gly Asn Gln Ile His Leu Lys Thr Leu Arg Asp Ala Phe Val Thr  
20 25 30

Val Met Pro Leu Tyr Ile Leu Ala Gly Leu Ile Val Leu Leu Asn Asn  
35 40 45

Thr Val Phe Lys Trp Ile Phe Gln Gly Asp Thr Leu Thr Arg Phe Gln  
50 55 60

Tyr Trp Gly Ile Thr Ile Ala Asn Gly Thr Leu Ser Ile Ser Gly Met  
65 70 75 80

Ile Ile Ala Val Met Val Gly Tyr Phe Leu Ala Lys Asn Arg Asp Phe  
85 90 95

Glu Asn Pro Leu Ala Ala Ser Met Leu Ser Leu Val Ser Leu Ile Val  
100 105 110

Met Met Pro Asn Thr Val Ser Val Val Pro Asp Gly Ala Lys Asp Ala  
115 120 125

Val Asn Ile Ser Gly Val Leu Ser Phe Asn Asn Thr Gly Thr Gly Ala  
130 135 140

Met Phe Ala Gly Val Ile Val Ala Ile Ile Ala Thr Glu Leu Phe Ile  
145 150 155 160

Glu Leu Ser Asn Val Lys Ala Leu Gln Met Asn Leu Gly Glu Asn Ile  
165 170 175

Pro Pro Ala Val Ser Arg Ser Phe Ser Val Leu Leu Pro Val Met Thr  
 180 185 190

Val Ile Ser Leu Phe Gly Val Val Ser Ala Leu Leu Phe Asn Ile Thr  
 195 200 205

Gly Met Asn Leu Ile Ser Ile Ile Thr Ile Phe Ile Gln Glu Pro Ile  
 210 215 220

Arg His Ile Gly Thr Ser Leu Ile Gly Val Ile Ile Ile Tyr Ser Leu  
 225 230 235 240

Gly Asn Met Leu Trp Leu Phe Gly Ile His Gln Ala Val Ile Tyr Ser  
 245 250 255

Ala Ile Leu Glu Pro Leu Leu Leu Ile Asn Ile Thr Glu Asn Ile Thr  
 260 265 270

Ala Ala Asn Asn Gly Gln Ala Ile Pro His Ile Ile Asn Leu Ser Gln  
 275 280 285

Ile Gln Thr Phe Ala Leu Met Gly Gly Ser Gly Ser Thr Leu Cys Leu  
 290 295 300

Leu Ile Ala Thr Phe Leu Val Ser Arg Asn Ala Val Ser Lys Asn Val  
 305 310 315 320

Ala Lys Leu Ser Phe Gly Pro Gly Ile Phe Asn Ile Asn Glu Pro Val  
 325 330 335

Leu Phe Gly Tyr Pro Ile Val Tyr Asn Ile Ser Leu Ala Ile Pro Phe  
 340 345 350

Ile Thr Val Pro Val Leu Gly Ile Leu Ile Ser Tyr Leu Ala Thr Val  
 355 360 365

Thr Glu Phe Met Ser Pro Ala Phe Ile Gln Val Pro Trp Thr Thr Pro  
 370 375 380

Val Phe Leu Asn Ala Trp Leu Ala Thr Ala Gly Asp Val Arg Ala Val  
 385 390 395 400

Leu Val Gln Phe Ile Ile Phe Ala Leu Gly Val Leu Leu Tyr Ile Pro  
 405 410 415

Phe Ile Lys Val Asn Asp Lys Val Val Glu Gln Glu Met Glu Gly  
 420 425 430

<210> 393

<211> 890

<212> PRT

<213> Streptococcus pneumoniae

<400> 393

Met Lys Ala Met Glu Glu Asn Met Ala Asp Lys Lys Thr Val Thr Pro  
 1 5 10 15

Glu Glu Lys Lys Leu Val Ala Glu Lys His Val Asp Glu Leu Val Gln  
 20 25 30

Lys Ala Leu Val Ala Leu Glu Glu Met Arg Lys Leu Asp Gln Glu Gln  
 35 40 45

Val Asp Tyr Ile Val Ala Lys Ala Ser Val Ala Ala Leu Asp Ala His  
 50 55 60

Gly Glu Leu Ala Leu His Ala Phe Glu Glu Thr Gly Arg Gly Val Phe  
 65 70 75 80

Glu Asp Lys Ala Thr Lys Asn Leu Phe Ala Cys Glu His Val Val Asn  
 85 90 95

Asn Met Arg His Thr Lys Thr Val Gly Val Ile Glu Glu Asp Asp Val  
 100 105 110

Thr Gly Leu Thr Leu Ile Ala Glu Pro Val Gly Val Val Cys Gly Ile  
 115 120 125

Thr Pro Thr Thr Asn Pro Thr Ser Thr Ala Ile Phe Lys Ser Leu Ile  
 130 135 140

Ser Leu Lys Thr Arg Asn Pro Ile Val Phe Ala Phe His Pro Ser Ala  
 145 150 155 160

Gln Glu Ser Ser Ala His Ala Ala Arg Ile Val Arg Asp Ala Ala Ile  
 165 170 175

Ala Ala Gly Ala Pro Glu Asn Cys Val Gln Trp Ile Thr Gln Pro Ser  
 180 185 190

Met Glu Ala Thr Ser Ala Leu Met Asn His Glu Gly Val Ala Thr Ile  
 195 200 205

Leu Ala Thr Gly Gly Asn Ala Met Val Lys Ala Ala Tyr Ser Cys Gly  
 210 215 220

Lys Pro Ala Leu Gly Val Gly Ala Gly Asn Val Pro Ala Tyr Val Glu  
 225 230 235 240

Lys Ser Ala Asn Ile Arg Gln Ala Ala His Asp Ile Val Met Ser Lys  
 245 250 255

Ser Phe Asp Asn Gly Met Val Cys Ala Ser Glu Gln Ala Val Ile Ile  
 260 265 270

Asp Lys Glu Ile Tyr Asp Glu Phe Val Ala Glu Phe Lys Ser Tyr His  
 275 280 285

Thr Tyr Phe Val Asn Lys Lys Glu Lys Ala Leu Leu Glu Glu Phe Cys  
 290 295 300

Phe Gly Val Lys Ala Asn Ser Lys Asn Cys Ala Gly Ala Lys Leu Asn  
 305 310 315 320

Ala Asp Ile Val Gly Lys Pro Ala Thr Trp Ile Ala Glu Gln Ala Gly  
 325 330 335

Phe Thr Val Pro Glu Gly Thr Asn Ile Leu Ala Ala Glu Cys Lys Glu  
 340 345 350

Val Gly Glu Asn Glu Pro Leu Thr Arg Glu Lys Leu Ser Pro Val Ile  
 355 360 365

Ala Val Leu Lys Ser Glu Ser Arg Glu Asp Gly Ile Thr Lys Ala Arg  
 370 375 380



Gln Met Val Glu Phe Asn Gly Leu Gly His Ser Ala Ala Ile His Thr  
 385 390 395 400

Ala Asp Glu Glu Leu Thr Lys Glu Phe Gly Lys Ala Val Lys Ala Ile  
 405 410 415

Arg Val Ile Cys Asn Ser Pro Ser Thr Phe Gly Gly Ile Gly Asp Val  
 420 425 430

Tyr Asn Ala Phe Leu Pro Ser Leu Thr Leu Gly Cys Gly Ser Tyr Gly  
 435 440 445

Arg Asn Ser Val Gly Asp Asn Val Ser Ala Ile Asn Leu Leu Asn Ile  
 450 455 460

Lys Lys Val Gly Arg Arg Arg Asn Asn Met Gln Trp Met Lys Leu Pro  
 465 470 475 480

Ser Lys Thr Tyr Phe Glu Arg Asp Ser Ile Gln Tyr Leu Gln Lys Cys  
 485 490 495

Arg Asp Val Glu Arg Val Met Ile Val Thr Asp His Ala Met Val Glu  
 500 505 510

Leu Gly Phe Leu Asp Arg Ile Ile Glu Gln Leu Asp Leu Arg Arg Asn  
 515 520 525

Lys Val Val Tyr Gln Ile Phe Ala Asp Val Glu Pro Asp Pro Asp Ile  
 530 535 540

Thr Thr Val Asn Arg Gly Thr Glu Ile Met Arg Ala Phe Lys Pro Asp  
 545 550 555 560

Thr Ile Ile Ala Leu Gly Gly Gly Ser Pro Met Asp Ala Ala Lys Val  
 565 570 575

Met Trp Leu Phe Tyr Glu Gln Pro Glu Val Asp Phe Arg Asp Leu Val  
 580 585 590

Gln Lys Phe Met Asp Ile Arg Lys Arg Ala Phe Lys Phe Pro Leu Leu

595	600	605																	
Gly	Lys	Lys	Thr	Lys	Phe	Ile	Ala	Ile	Pro	Thr	Thr	Ser	Gly	Thr	Gly				
610						615					620								
Ser	Glu	Val	Thr	Pro	Phe	Ala	Val	Ile	Ser	Asp	Lys	Ala	Asn	Asn	Arg				
625					630					635					640				
Lys	Tyr	Pro	Ile	Ala	Asp	Tyr	Ser	Leu	Thr	Pro	Thr	Val	Ala	Ile	Val				
				645					650					655					
Asp	Pro	Ala	Leu	Val	Leu	Thr	Val	Pro	Gly	Phe	Val	Ala	Ala	Asp	Thr				
			660					665						670					
Gly	Met	Asp	Val	Leu	Thr	His	Ala	Thr	Glu	Ala	Tyr	Val	Ser	Gln	Met				
		675					680						685						
Ala	Ser	Asp	Tyr	Thr	Asp	Gly	Leu	Ala	Leu	Gln	Ala	Ile	Lys	Leu	Val				
		690				695					700								
Phe	Glu	Asn	Leu	Glu	Ser	Ser	Val	Lys	Asn	Ala	Asp	Phe	His	Ser	Arg				
705					710					715					720				
Glu	Lys	Met	His	Asn	Ala	Ser	Thr	Ile	Ala	Gly	Met	Ala	Phe	Ala	Asn				
				725					730					735					
Ala	Phe	Leu	Gly	Ile	Ser	His	Ser	Met	Ala	His	Lys	Ile	Gly	Ala	Gln				
			740					745					750						
Phe	His	Thr	Ile	His	Gly	Arg	Thr	Asn	Ala	Ile	Leu	Leu	Pro	Tyr	Val				
		755					760					765							
Ile	Arg	Tyr	Asn	Gly	Thr	Arg	Pro	Ala	Lys	Thr	Ala	Thr	Trp	Pro	Lys				
		770				775					780								
Tyr	Asn	Tyr	Tyr	Arg	Ala	Asp	Glu	Lys	Tyr	Gln	Asp	Ile	Ala	Arg	Met				
785					790					795					800				
Leu	Gly	Leu	Pro	Ala	Ser	Thr	Pro	Glu	Glu	Gly	Val	Glu	Ser	Tyr	Ala				
				805					810					815					

Lys Ala Val Tyr Glu Leu Gly Glu Arg Ile Gly Ile Gln Met Asn Phe  
                   820                  825                  830

Arg Asp Gln Gly Ile Asp Glu Lys Glu Trp Lys Glu His Ser Arg Lys  
                   835                  840                  845

Leu Ala Phe Leu Ala Tyr Glu Asp Gln Cys Ser Pro Ala Asn Pro Arg  
           850                  855                  860

Leu Pro Met Val Asp His Met Gln Glu Ile Ile Glu Asp Ala Tyr Tyr  
  865                  870                  875                  880

Gly Tyr Lys Glu Arg Pro Gly Arg Arg Lys  
                   885                  890

<210> 394

<211> 99

<212> PRT

<213> Streptococcus pneumoniae

<400> 394

Met Asn Pro Asn Ile Thr Phe Leu Ile Met Leu Val Gly Met Met Ala  
  1                  5                  10                  15

Leu Met Phe Phe Met Gln Arg Ser Gln Lys Lys Gln Ala Gln Lys Arg  
           20                  25                  30

Met Glu Ser Leu Asn Lys Leu Gln Lys Gly Tyr Glu Val Ile Thr Ile  
           35                  40                  45

Gly Gly Leu Tyr Gly Thr Val Asp Glu Val Asp Thr Glu Lys Gly Thr  
           50                  55                  60

Ile Val Leu Asp Val Asp Gly Val Tyr Leu Thr Phe Glu Leu Ala Ala  
  65                  70                  75                  80

Ile Lys Thr Val Leu Pro Leu Lys Glu Thr Ala Ser Leu Glu Gly Ala  
           85                  90                  95

Ile Glu Lys

&lt;210&gt; 395

&lt;211&gt; 605

&lt;212&gt; PRT

&lt;213&gt; Streptococcus pneumoniae

&lt;400&gt; 395

Met Arg Ile Lys Trp Phe Ser Leu Ile Arg Ile Ile Gly Leu Leu Leu  
 1 5 10 15

Val Leu Leu Tyr His Phe Phe Gln Thr Ile Phe Pro Gly Gly Phe Phe  
 20 25 30

Gly Val Asp Val Phe Phe Thr Phe Ser Gly Phe Leu Ile Thr Ala Leu  
 35 40 45

Leu Ile Glu Glu Phe Ser Lys Asn Asn Glu Ile Asp Leu Ile Gly Phe  
 50 55 60

Phe Arg Arg Arg Phe Tyr Arg Ile Val Pro Pro Val Val Leu Met Val  
 65 70 75 80

Leu Val Thr Met Pro Phe Thr Phe Leu Val Arg Gln Asp Tyr Val Ala  
 85 90 95

Gly Ile Gly Gly Gln Ile Ala Gly Val Leu Gly Phe Met Thr Asn Phe  
 100 105 110

Tyr Glu Leu Leu Thr Gly Gly Ser Tyr Glu Ser Gln Phe Ile Pro His  
 115 120 125

Leu Phe Val His Asn Trp Ser Leu Ala Val Glu Val His Tyr Tyr Ile  
 130 135 140

Leu Trp Gly Leu Ala Val Trp Phe Leu Ser Lys Gln Ala Lys Ser Asn  
 145 150 155 160

Gly Gln Leu Lys Gly Met Val Phe Leu Leu Ser Ala Val Ala Phe Leu  
 165 170 175

Ile Ser Phe Phe Ser Met Phe Ile Gly Ser Phe Leu Val Thr Ser Tyr  
 180 185 190

Ser Ser Val Tyr Phe Ser Ser Leu Thr His Val Tyr Pro Phe Phe Leu  
 195 200 205

Gly Ser Met Leu Ala Thr Ile Val Gly Val Arg Gln Thr Thr Ser Leu  
 210 215 220

Val Lys Gln Leu Asp Lys Ile Trp Asp Leu Arg Lys Thr Leu Val Val  
 225 230 235 240

Phe Gly Gly Gly Phe Gly Phe Leu Val Leu Leu Thr Phe Phe Val Lys  
 245 250 255

Phe Thr Tyr Leu Phe Ala Tyr Leu Ile Gly Phe Leu Leu Ala Ser Leu  
 260 265 270

Ala Ala Leu Ala Met Ile Leu Ala Ala Arg Val Leu His Glu Lys Thr  
 275 280 285

His His Ile Gln Glu Ser Lys Ile Ile Ser Phe Leu Ala Asp Thr Ser  
 290 295 300

Tyr Ala Val Tyr Leu Phe His Trp Pro Phe Tyr Ile Ile Phe Ser Gln  
 305 310 315 320

Leu Thr Ser Asn Leu Leu Ala Val Leu Leu Thr Leu Ile Cys Ser Tyr  
 325 330 335

Gly Phe Ala Ser Leu Ser Phe Tyr Val Leu Glu Pro Trp Ile Ala Gly  
 340 345 350

Lys Asn Thr Pro Ile Val Gln Thr Leu Arg Pro Leu Pro Tyr Ile His  
 355 360 365

Ala Ile Leu Ala Ala Gly Thr Gly Ile Leu Thr Ile Ile Val Cys Thr  
 370 375 380

Val Thr Leu Leu Ala Pro Gln Val Gly Ala Phe Glu Thr Asp Leu Thr  
 385 390 395 400

Val Asn Gly Leu Lys Gln Ala Ala Thr Asn Ile Gly Gln Thr Lys Val  
 405 410 415

Met Ala Glu Arg Ala Asp Ala Asn Ser Leu Gly Ile Ala Asp Gly Thr  
 420 425 430

Met Leu Ile Gly Asp Ser Val Ala Leu Arg Ala Asn Thr Ala Leu Gln  
 435 440 445

Thr Ala Leu Pro Gly Ala Gln Ile Asn Ala Gln Val Ser Val Thr Thr  
 450 455 460

Lys Thr Ala Asn Glu Ile Met Leu Asn Asn Ser Gln Asn Lys Phe Leu  
 465 470 475 480

Pro Lys Thr Val Val Ile Ala Thr Gly Val Asn Asn Pro Glu Asn Tyr  
 485 490 495

Lys Asp Asp Trp Asp Ser Ile Val Lys Asn Leu Pro Lys Gly His His  
 500 505 510

Met Ile Leu Val Thr Pro Tyr Glu Gly Asp Lys Thr Lys Glu Thr Tyr  
 515 520 525

Ala Ile Val Glu Lys Ala Ala Ala Tyr Met Arg Glu Leu Ala Glu Lys  
 530 535 540

Thr Pro Tyr Ile Thr Ile Ala Asp Trp Asn Gln Val Ala Lys Glu His  
 545 550 555 560

Pro Glu Ile Trp Ala Gly Thr Asp Gln Val His Phe Gly Ser Glu Ser  
 565 570 575

Ser Thr Ile Glu Ala Gly Ala Lys Leu Tyr Ala Asp Thr Ile Ala Thr  
 580 585 590

Ala Leu Gln Thr Ala Gln Asp Lys Pro Val Lys Ser Lys  
 595 600 605

<210> 396

<211> 119

<212> PRT

<213> Streptococcus pneumoniae

<400> 396

Met Ser Ile Ile Leu Thr Thr Ile Val Ala Leu Glu His Phe Tyr Ile  
 1 5 10 15

Phe Tyr Leu Glu Ser Ile Ala Thr Gln Ser Asp Ala Thr Ser Arg Val  
 20 25 30

Phe Asn Met Glu Lys Glu Glu Leu Ala His Pro Ser Val Ser Ser Leu  
 35 40 45

Phe Lys Asn Gln Gly Ile Tyr Lys Ala Leu Leu Gly Val Phe Leu Leu  
 50 55 60

Tyr Val Ile Tyr Phe Ser Gln Asn Leu Glu Ile Val Thr Ile Phe Val  
 65 70 75 80

Leu Phe Val Ile Gly Ala Ala Thr Tyr Gly Ser Leu Thr Ala Asp Lys  
 85 90 95

Lys Ile Ile Leu Lys Gln Gly Gly Ser Ala Ile Leu Ala Leu Ile Ser  
 100 105 110

Ile Leu Leu Phe Lys Tyr Thr  
 115

<210> 397  
 <211> 603  
 <212> PRT  
 <213> Streptococcus pneumoniae

<400> 397

Met Ala Val Ala Asn Cys Ala Lys Tyr Asn Ile Arg Arg Ser Lys Met  
 1 5 10 15

Lys Thr Val Gln Phe Phe Trp His Tyr Phe Lys Val Tyr Lys Phe Ser  
 20 25 30

Phe Val Val Val Ile Leu Met Ile Val Leu Ala Thr Phe Ala Gln Ala  
 35 40 45

Leu Phe Pro Val Phe Ser Gly Gln Ala Val Thr Gln Leu Ala Asn Leu  
 50 55 60

Val Gln Ala Tyr Gln Asn Gly Asn Pro Glu Leu Val Trp Gln Ser Leu  
 65 70 75 80

Ser Gly Ile Met Val Asn Leu Gly Leu Leu Val Leu Val Leu Phe Ile  
 85 90 95

Ser Ser Val Ile Tyr Met Cys Leu Met Thr Arg Val Ile Ala Glu Ser  
 100 105 110

Thr Asn Glu Met Arg Lys Gly Leu Phe Gly Lys Leu Ala Gln Leu Thr  
 115 120 125

Val Ser Phe Phe Asp Arg Arg Gln Asp Gly Asp Ile Leu Ser His Phe  
 130 135 140

Thr Ser Asp Leu Asp Asn Ile Leu Gln Ala Phe Asn Glu Ser Leu Ile  
 145 150 155 160

Gln Val Met Ser Asn Ile Val Leu Tyr Ile Gly Leu Ile Leu Val Met  
 165 170 175

Phe Ser Arg Asn Val Thr Leu Ala Leu Ile Thr Ile Ala Ser Thr Pro  
 180 185 190

Leu Ala Phe Leu Met Leu Ile Phe Ile Val Lys Met Ala Arg Lys Tyr  
 195 200 205

Thr Asn Leu Gln Gln Lys Glu Val Gly Lys Leu Asn Ala Tyr Met Asp  
 210 215 220

Glu Ser Ile Ser Gly Gln Lys Ala Val Ile Val Gln Gly Ile Gln Glu  
 225 230 235 240

Asp Met Met Ala Gly Phe Leu Glu Gln Asn Glu Arg Val Arg Lys Ala  
 245 250 255

Thr Phe Lys Gly Arg Met Phe Ser Gly Ile Leu Phe Pro Val Met Asn  
 260 265 270

Gly Met Ser Leu Ile Asn Thr Ala Ile Val Ile Phe Ala Gly Ser Ala  
 275 280 285



Val Leu Leu Asn Asp Lys Ser Ile Glu Thr Ser Thr Ala Leu Gly Leu  
 290 295 300

Ile Val Met Phe Ala Gln Phe Ser Gln Gln Tyr Tyr Gln Pro Ile Ile  
 305 310 315 320

Gln Val Ala Ala Ser Trp Gly Ser Leu Gln Leu Ala Phe Thr Gly Ala  
 325 330 335

Glu Arg Ile Gln Glu Met Phe Asp Ala Glu Glu Glu Ile Arg Pro Glu  
 340 345 350

Lys Ala Pro Thr Phe Thr Lys Leu Gln Glu Ser Val Glu Ile Ser His  
 355 360 365

Ile Val Phe Ser Tyr Leu Pro Asp Lys Pro Ile Leu Lys Asp Val Ser  
 370 375 380

Ile Ser Ala Pro Lys Gly Gln Met Thr Ala Val Val Gly Pro Thr Gly  
 385 390 395 400

Ser Gly Lys Thr Thr Ile Met Asn Leu Ile Asn Arg Phe Tyr Asp Val  
 405 410 415

Asp Ala Gly Gly Ile Tyr Phe Asp Gly Lys Asp Ile Arg Gly Tyr Asp  
 420 425 430

Leu Asp Ser Leu Arg Ser Lys Val Gly Ile Val Leu Gln Asp Ser Val  
 435 440 445

Leu Phe Ser Gly Thr Ile Arg Asp Asn Ile Arg Phe Gly Val Pro Asp  
 450 455 460

Ala Ser Gln Glu Met Val Glu Val Ala Ala Lys Ala Thr His Ile His  
 465 470 475 480

Asp Tyr Ile Glu Ser Leu Pro Asp Lys Tyr Asp Thr Leu Ile Asp Asp  
 485 490 495

Asp Gln Ser Ile Phe Ser Thr Gly Gln Lys Gln Leu Ile Ser Ile Ala

500                                      505                                      510  
 Arg Thr Leu Met Thr Asp Pro Glu Val Leu Ile Leu Asp Glu Ala Thr  
                  515                                      520                                      525  
 Ser Asn Val Asp Thr Val Thr Glu Ser Lys Ile Gln His Ala Met Glu  
                  530                                      535                                      540  
 Val Val Val Ala Gly Arg Thr Ser Phe Val Ile Ala His Arg Leu Lys  
 545                                      550                                      555                                      560  
 Thr Ile Leu Asn Ala Asp Gln Ile Ile Val Leu Lys Asp Gly Glu Val  
                                  565                                      570                                      575  
 Ile Glu Arg Gly Asn His His Glu Leu Leu Lys Leu Gly Gly Phe Tyr  
                                  580                                      585                                      590  
 Ser Glu Leu Tyr His Asn Gln Phe Val Phe Glu  
                                  595                                      600  
  
 <210> 398  
 <211> 250  
 <212> PRT  
 <213> Streptococcus pneumoniae  
  
 <400> 398  
 Met Gly Thr Phe Ser Val Arg His Leu Asp Leu Phe Tyr Gly Asp Phe  
 1                                      5                                      10                                      15  
 Gln Ala Leu Lys Asn Ile Ser Ile Gln Leu Pro Glu Arg Gln Ile Thr  
                                  20                                      25                                      30  
 Ala Leu Ile Gly Pro Ser Gly Cys Gly Lys Ser Thr Phe Leu Lys Thr  
                                  35                                      40                                      45  
 Leu Asn Arg Met Asn Asp Leu Val Pro Ser Cys His Ile Glu Gly Gln  
                                  50                                      55                                      60  
 Val Leu Leu Asp Glu Gln Asp Ile Tyr Ser Ser Lys Phe Asn Leu Asn  
 65                                      70                                      75                                      80  
 Gln Leu Arg Lys Arg Val Gly Met Val Phe Gln Gln Pro Asn Pro Phe

85 90 95  
 Ala Met Ser Ile Tyr Asp Asn Val Ala Tyr Gly Pro Arg Thr His Gly  
 100 105 110  
 Ile Arg Asp Lys Lys Gln Leu Asp Ala Leu Val Glu Lys Ser Leu Lys  
 115 120 125  
 Gly Ala Ala Ile Trp Glu Glu Val Lys Asp Asp Leu Lys Lys Ser Ala  
 130 135 140  
 Met Ser Leu Ser Gly Gly Gln Gln Gln Arg Leu Cys Ile Ala Arg Ala  
 145 150 155 160  
 Leu Ala Val Glu Pro Asp Ile Leu Leu Met Asp Glu Pro Thr Ser Ala  
 165 170 175  
 Leu Asp Pro Ile Ser Thr Leu Lys Ile Glu Asp Leu Ile Gln Gln Leu  
 180 185 190  
 Lys Lys Asp Tyr Thr Ile Ile Ile Val Thr His Asn Met Gln Gln Ala  
 195 200 205  
 Ser Arg Ile Ser Asp Lys Thr Ala Phe Phe Leu Thr Gly Glu Ile Cys  
 210 215 220  
 Glu Phe Gly Asp Thr Val Asp Val Phe Thr Asn Pro Lys Asp Gln Arg  
 225 230 235 240  
 Thr Glu Asp Tyr Ile Ser Gly Arg Phe Gly  
 245 250

&lt;210&gt; 399

&lt;211&gt; 226

&lt;212&gt; PRT

&lt;213&gt; Streptococcus pneumoniae

&lt;400&gt; 399

Met Met Lys Glu Ile Phe Asp Arg Arg Tyr Pro Val Thr Ser Phe Phe  
 1 5 10 15

Leu Leu Val Thr Ala Leu Val Phe Leu Leu Met Leu Val Thr Ala Gly

	20		25		30	
Gly Asn Phe Asp Arg Ala Asp Thr Leu Phe Arg Phe Gly Ala Met Tyr	35		40		45	
Gly Pro Ala Ile Arg Leu Phe Pro Glu Gln Val Trp Arg Leu Leu Ser	50		55		60	
Ala Ile Phe Val His Ile Gly Trp Glu His Phe Ile Val Asn Met Leu	65		70		75	80
Ser Leu Tyr Tyr Leu Gly Arg Gln Val Glu Glu Ile Phe Gly Ser Lys		85		90		95
Gln Phe Phe Phe Leu Tyr Leu Leu Ser Gly Met Met Gly Asn Leu Phe		100		105		110
Val Phe Val Phe Ser Pro Lys Ser Leu Ala Ala Gly Ala Ser Thr Ser		115		120		125
Leu Tyr Gly Leu Phe Ala Ala Ile Ile Val Leu Arg Tyr Ala Thr Arg		130		135		140
Asn Pro Tyr Ile Gln Gln Leu Gly Gln Ser Tyr Leu Thr Leu Phe Val		145		150		155
						160
Val Asn Ile Ile Gly Ser Val Leu Ile Pro Gly Ile Ser Leu Ala Gly		165		170		175
His Ile Gly Gly Ala Val Gly Gly Ala Phe Leu Ala Val Ile Phe Pro		180		185		190
Val Arg Gly Glu Lys Arg Met Tyr Asn Thr Ser Gln Arg Leu Gly Ala		195		200		205
Val Val Leu Phe Val Gly Leu Ala Ile Leu Leu Phe Tyr Lys Gly Met		210		215		220
Gly Leu						
225						

&lt;210&gt; 400

&lt;211&gt; 232

&lt;212&gt; PRT

&lt;213&gt; Streptococcus pneumoniae

&lt;400&gt; 400

Met Thr Ala Thr Lys Met Asn Ala Gln Glu Ile Ile Gln Phe Ile Ala  
 1 5 10 15

Asn Ala Glu Lys Lys Thr Ser Val Lys Val Thr Phe Glu Gly Gln Leu  
 20 25 30

Ala Thr Ala Val Pro Ser Ser Val Val Lys Leu Gly Asn Val Leu Phe  
 35 40 45

Gly Asp Trp Lys Asp Val Ala Pro Leu Leu Glu Gly Leu Val Glu Asn  
 50 55 60

Gln Asp Tyr Val Val Glu Gln Asp Ala Arg Asn Ser Ala Val Pro Leu  
 65 70 75 80

Leu Asp Lys Arg Ala Ile Asn Ala Arg Ile Glu Pro Gly Ala Ile Ile  
 85 90 95

Arg Asp Gln Val Glu Ile Gly Asp Asn Ala Val Ile Met Met Gly Ser  
 100 105 110

Val Ile Asn Ile Gly Ala Glu Ile Gly Ala Gly Thr Met Ile Asp Met  
 115 120 125

Gly Ala Ile Leu Gly Gly Arg Ala Ile Val Gly Lys Asn Ser His Val  
 130 135 140

Gly Ala Gly Ala Val Leu Ala Gly Val Ile Glu Pro Ala Ser Ala Glu  
 145 150 155 160

Pro Val Arg Val Gly Asp Asn Val Leu Ile Gly Ala Asn Ala Val Val  
 165 170 175

Ile Glu Gly Val Gln Ile Gly Ser Gly Ser Val Val Ala Ala Gly Ala  
 180 185 190

Ile Val Thr Gln Asp Val Pro Glu Asn Val Val Val Ala Gly Val Pro  
 195 200 205

Ala Arg Ile Ile Lys Glu Ile Asp Ala Gln Thr Gln Gln Lys Thr Ala  
 210 215 220

Leu Glu Asp Ala Leu Arg Thr Leu  
 225 230

<210> 401  
 <211> 361  
 <212> PRT  
 <213> Streptococcus pneumoniae

<400> 401

Met Trp Gly Val Tyr Gln Leu His Pro Ala Pro Ala Val Gln Val Val  
 1 5 10 15

Val Leu Ala Ile Ala Val Thr Gln Val Leu His Asp Leu Leu Leu Gln  
 20 25 30

Gly Arg Asp Asp Asn Ser Leu Asn Glu Val Ala Asn Gln Trp Ile Ala  
 35 40 45

Thr Phe Phe Leu Ser Cys Tyr Asn Lys Gly Met Asn Gln Tyr Gln Lys  
 50 55 60

Lys Ile Val Asn Gly Lys Ile Tyr Ser Leu Leu Ser Gly Leu Ile Trp  
 65 70 75 80

Gly Ile Cys Gly Ile Leu Gly Glu Tyr Phe Phe Thr His Tyr Gln Val  
 85 90 95

Ser Ser Gly Trp Ile Thr Ser Met Arg Leu Thr Leu Ala Gly Ser Leu  
 100 105 110

Val Leu Ile Trp Ser Ala Ile Gln Leu Lys Ser Gln Val Leu Asp Ile  
 115 120 125

Trp Arg Asp Lys Lys Asn Tyr Leu Pro Phe Leu Ala Tyr Ala Ile Leu  
 130 135 140

Gly Ile Phe Ser Val Gln Tyr Phe Phe Tyr Leu Cys Val Glu Tyr Ser  
 145 150 155 160

Asn Ala Thr Thr Ala Thr Ile Leu Gln Phe Ile Ser Pro Val Phe Ile  
 165 170 175

Leu Phe Tyr Asn Arg Leu Val Tyr Gln Lys Arg Ala Ser Lys Ser Ala  
 180 185 190

Val Phe Tyr Val Leu Val Ala Met Leu Gly Val Cys Leu Met Ala Thr  
 195 200 205

Lys Gly Asp Leu Ser Gln Leu Ser Met Thr Pro Leu Ala Leu Ile Thr  
 210 215 220

Gly Leu Leu Ser Ala Met Gly Val Met Phe Asn Val Ile Leu Pro Gln  
 225 230 235 240

Pro Phe Ala Lys Arg Tyr Gly Phe Val Pro Thr Val Gly Trp Gly Met  
 245 250 255

Ile Leu Ala Gly Leu Phe Ser Asn Val Leu Ser Pro Val Tyr Gln Leu  
 260 265 270

Ser Phe Thr Leu Asp Ile Trp Ser Ile Leu Ile Cys Leu Ile Ile Ala  
 275 280 285

Phe Phe Gly Thr Ala Phe Ala Phe Phe Ile Ser Met Lys Ala Val Ser  
 290 295 300

Leu Val Ser Pro Leu Val Val Ala Val Ile Ser Ala Ser Glu Pro Leu  
 305 310 315 320

Ser Ser Ala Leu Leu Ser Val Leu Phe Leu Gly Leu Val Val Asp Trp  
 325 330 335

Ser Leu Leu Leu Ala Ile Ala Leu Ile Ile Leu Pro Met Ile Phe Leu  
 340 345 350

Ser Ile Glu Glu Ala Lys Glu Ser Arg  
 355 360

<210> 402  
 <211> 190  
 <212> PRT  
 <213> Streptococcus pneumoniae

<400> 402

Met Asn Lys Leu Met Lys Phe Ile Ser Val Phe Leu Thr Ser Ile Val  
 1 5 10 15

Leu Ile Val Ser Ala Ile Pro Ser Val Ser Ala Val Tyr Ala Ser Glu  
 20 25 30

Gln Val Ser Gln Ile Glu Thr Asn Met Glu Leu Gln Pro Val Thr Ser  
 35 40 45

Leu Thr Glu Glu Gln Ile Asn Thr Leu Ala Asn Glu Ile Gln Ser Phe  
 50 55 60

His Pro Asp Val Ser Gln Gln Trp Ile Lys Glu Val Ile Asn Arg Gln  
 65 70 75 80

Leu Gln Gly Asp Tyr Thr Ile Pro Pro Thr Tyr Ser Pro Phe Arg Ala  
 85 90 95

Val Trp Gln Gly Ile Thr Val Asn Gln Met Gly Ala Leu Leu Asp Thr  
 100 105 110

Ala Ile Ala Leu Ala Leu Gly Gly Thr Thr Ala Gly Leu Ala Asn Leu  
 115 120 125

Ile Lys Val Lys Gly Lys His Ala Ala Lys Ser Ala Ile Arg Ser Ala  
 130 135 140

Ile Ser Arg Tyr Leu Gly Ser Trp Phe Val Asn Asp Val Ala Leu Glu  
 145 150 155 160

Phe Ala Met Asn Leu Leu Ser Pro Gly Thr Tyr Leu Ala Gln Leu Trp  
 165 170 175

Asp Lys Asn Asp Ala Ile Pro Asn Asn Gly Arg Ile Asn Phe  
 180 185 190



<210> 403  
 <211> 435  
 <212> PRT  
 <213> Streptococcus pneumoniae

<400> 403

Met Lys Gly Val Asn Met Glu Lys Gln Gln Pro Ser Lys Ala Ala Leu  
 1 5 10 15

Leu Ser Ile Ile Pro Gly Leu Gly Gln Ile Tyr Asn Lys Gln Lys Ala  
 20 25 30

Lys Gly Phe Ile Phe Leu Gly Val Thr Ile Val Phe Val Leu Tyr Phe  
 35 40 45

Leu Ala Leu Ala Thr Pro Glu Leu Ser Asn Leu Ile Thr Leu Gly Asp  
 50 55 60

Lys Pro Gly Arg Asp Asn Ser Leu Phe Met Leu Ile Arg Gly Ala Phe  
 65 70 75 80

His Leu Ile Phe Val Ile Val Tyr Val Leu Phe Tyr Phe Ser Asn Ile  
 85 90 95

Lys Asp Ala His Thr Ile Ala Lys Arg Ile Asn Asn Gly Ile Pro Val  
 100 105 110

Pro Arg Thr Leu Lys Asp Met Ile Lys Gly Ile Tyr Glu Asn Gly Phe  
 115 120 125

Pro Tyr Leu Leu Ile Ile Pro Ser Tyr Val Ala Met Thr Phe Ala Ile  
 130 135 140

Ile Phe Pro Val Ile Val Thr Leu Met Ile Ala Phe Thr Asn Tyr Asp  
 145 150 155 160

Phe Gln His Leu Pro Pro Asn Lys Leu Leu Asp Trp Val Gly Leu Thr  
 165 170 175

Asn Phe Thr Asn Ile Trp Ser Leu Ser Thr Phe Arg Ser Ala Phe Gly  
 180 185 190

Ser Val Leu Ser Trp Thr Ile Ile Trp Ala Leu Ala Ala Ser Thr Leu  
 195 200 205

Gln Ile Val Ile Gly Ile Phe Thr Ala Ile Ile Ala Asn Gln Pro Phe  
 210 215 220

Ile Lys Gly Lys Arg Ile Phe Gly Val Ile Phe Leu Leu Pro Trp Ala  
 225 230 235 240

Val Pro Ala Phe Ile Thr Ile Leu Thr Phe Ser Asn Met Phe Asn Asp  
 245 250 255

Ser Val Gly Ala Ile Asn Thr Gln Val Leu Pro Ile Leu Ala Lys Phe  
 260 265 270

Leu Pro Phe Leu Asp Gly Ala Leu Ile Pro Trp Lys Thr Asp Pro Thr  
 275 280 285

Trp Thr Lys Ile Ala Leu Ile Met Met Gln Gly Trp Leu Gly Phe Pro  
 290 295 300

Tyr Ile Tyr Val Leu Thr Leu Gly Ile Leu Gln Ser Ile Pro Asn Asp  
 305 310 315 320

Leu Tyr Glu Ala Ala Tyr Ile Asp Gly Ala Asn Ala Trp Gln Lys Phe  
 325 330 335

Arg Asn Ile Thr Phe Pro Met Ile Leu Ala Val Ala Ala Pro Thr Leu  
 340 345 350

Ile Ser Gln Tyr Thr Phe Asn Phe Asn Asn Phe Ser Ile Met Tyr Leu  
 355 360 365

Phe Asn Gly Gly Gly Pro Gly Ser Val Gly Gly Gly Ala Gly Ser Thr  
 370 375 380

Asp Ile Leu Ile Ser Trp Ile Tyr Arg Leu Thr Thr Gly Thr Ser Pro  
 385 390 395 400

Gln Tyr Ser Met Ala Ala Ala Val Thr Leu Ile Ile Ser Ile Ile Val  
 405 410 415

Ile Ser Ile Ser Met Ile Ala Phe Lys Lys Leu His Ala Phe Asp Met  
 420 425 430

Glu Asp Val  
 435

<210> 404  
 <211> 287  
 <212> PRT  
 <213> Streptococcus pneumoniae  
 <400> 404

Met Ile Trp Arg Thr Ser Lys Met Asn Asn Ser Ile Lys Leu Lys Arg  
 1 5 10 15

Arg Leu Thr Gln Ser Leu Thr Tyr Leu Tyr Leu Ile Gly Leu Ser Ile  
 20 25 30

Val Ile Ile Tyr Pro Leu Leu Ile Thr Ile Met Ser Ala Phe Lys Ala  
 35 40 45

Gly Asn Val Ser Ala Phe Lys Leu Asp Thr Asn Ile Asp Leu Asn Phe  
 50 55 60

Asp Asn Phe Lys Gly Leu Phe Thr Glu Thr Leu Tyr Gly Thr Trp Tyr  
 65 70 75 80

Leu Asn Thr Leu Ile Ile Ala Leu Ile Thr Met Ala Val Gln Thr Ser  
 85 90 95

Ile Ile Val Leu Ala Gly Tyr Ala Tyr Ser Arg Tyr Asn Phe Leu Ala  
 100 105 110

Arg Lys Gln Ser Leu Val Phe Phe Leu Ile Ile Gln Met Val Pro Thr  
 115 120 125

Met Ala Ala Leu Thr Ala Phe Phe Val Met Ala Leu Met Leu Asn Ala  
 130 135 140

Leu Asn His Asn Trp Phe Leu Ile Phe Leu Tyr Val Gly Gly Gly Ile  
 145 150 155 160

Pro Met Asn Ala Trp Leu Met Lys Gly Tyr Phe Asp Thr Val Pro Met  
 165 170 175

Ser Leu Asp Glu Ser Ala Lys Leu Asp Gly Ala Gly His Phe Arg Arg  
 180 185 190

Phe Trp Gln Ile Val Leu Pro Leu Val Arg Pro Met Val Ala Val Gln  
 195 200 205

Ala Leu Trp Ala Phe Met Gly Pro Phe Gly Asp Tyr Ile Leu Ser Ser  
 210 215 220

Phe Leu Leu Arg Glu Lys Glu Tyr Phe Thr Val Ala Val Gly Leu Gln  
 225 230 235 240

Thr Phe Val Asn Asn Ala Lys Asn Leu Lys Ile Ala Tyr Phe Ser Ala  
 245 250 255

Gly Ala Ile Leu Ile Ala Leu Pro Ile Cys Ile Leu Phe Phe Phe Leu  
 260 265 270

Gln Lys Asn Phe Val Ser Gly Leu Thr Ser Gly Gly Asp Lys Gly  
 275 280 285

<210> 405

<211> 266

<212> PRT

<213> Streptococcus pneumoniae

<400> 405

Met Leu Pro Tyr Pro Phe Ser Tyr Phe Ser Ser Ile Trp Gly Val Arg  
 1 5 10 15

Lys Pro Leu Ser Lys Arg Phe Glu Leu Asn Trp Phe Gln Leu Leu Phe  
 20 25 30

Thr Ser Ile Phe Leu Ile Ser Leu Ser Met Val Pro Ile Ala Ile Gln  
 35 40 45

Asn Ser Ser Gln Glu Thr Tyr Pro Leu Glu Thr Phe Ile Asp Asn Val  
 50 55 60

Tyr Glu Pro Leu Thr Asp Lys Val Val Gln Asp Leu Ser Glu His Ala  
65 70 75 80

Thr Ile Val Asp Gly Thr Leu Thr Tyr Thr Gly Thr Ala Ser Gln Ala  
85 90 95

Pro Ser Val Val Ile Gly Pro Ser Gln Ile Lys Glu Leu Pro Lys Asp  
100 105 110

Leu Gln Leu His Phe Asp Thr Asn Glu Leu Val Ile Ser Lys Glu Ser  
115 120 125

Lys Glu Leu Thr Arg Ile Ser Tyr Arg Ala Ile Gln Thr Glu Ser Phe  
130 135 140

Lys Ser Lys Asp Ser Leu Thr Gln Ala Ile Ser Lys Asp Trp Tyr Gln  
145 150 155 160

Gln Asn Arg Val Tyr Ile Ser Leu Phe Leu Val Leu Gly Ala Ser Phe  
165 170 175

Leu Phe Gly Leu Asn Phe Phe Ile Val Ser Leu Gly Ala Ser Phe Leu  
180 185 190

Leu Tyr Ile Thr Lys Arg Ser Arg Leu Phe Ser Phe Asn Thr Phe Lys  
195 200 205

Glu Cys Tyr His Phe Ile Leu Asn Cys Leu Gly Leu Pro Thr Leu Ile  
210 215 220

Thr Leu Ile Leu Gly Leu Phe Gly Gln Asn Met Thr Thr Leu Ile Thr  
225 230 235 240

Val Gln Asn Ile Leu Phe Val Leu Tyr Leu Val Thr Ile Phe Tyr Lys  
245 250 255

Thr His Phe Arg Asp Pro Asn Tyr His Lys  
260 265

<210> 406

&lt;211&gt; 313

&lt;212&gt; PRT

&lt;213&gt; Streptococcus pneumoniae

&lt;400&gt; 406

Met Lys Gln Thr Lys Arg Ile Lys Arg Trp Arg Tyr Tyr Leu Arg Arg  
 1 5 10 15

Phe Ala Tyr Gln Ile Lys Ile Leu Arg Val Leu Gln Ser Ile Ser Arg  
 20 25 30

Glu Lys Tyr Asp Glu Lys Ile Ser Ala Ser Leu Val Tyr Gly Phe Leu  
 35 40 45

Ser Ala Val Ala Val Asn Phe Phe Phe Gln Pro Gly His Val Tyr Ser  
 50 55 60

Ser Gly Ala Thr Gly Leu Ala Gln Ile Ile Ser Ala Leu Ser Asn His  
 65 70 75 80

Trp Phe Gly Phe His Ile Pro Ile Ser Leu Ser Phe Tyr Ala Ile Asn  
 85 90 95

Phe Pro Leu Met Val Leu Ala Trp Tyr Gln Ile Gly His Lys Phe Thr  
 100 105 110

Val Phe Thr Phe Ile Thr Val Ser Met Ser Ser Phe Phe Ile Gln Phe  
 115 120 125

Val Pro Val Ala Thr Leu Thr Glu Asp Pro Ile Ile Asn Ser Leu Phe  
 130 135 140

Gly Gly Val Val Met Gly Leu Gly Ile Gly Phe Ala Leu Arg Asn Asn  
 145 150 155 160

Ile Ser Ser Gly Gly Thr Asp Ile Val Ser Leu Thr Ile Arg Lys Lys  
 165 170 175

Thr Gly Lys Asn Val Gly Ser Ile Ser Phe Leu Val Asn Gly Thr Ile  
 180 185 190

Met Leu Ile Ala Gly Leu Thr Phe Gly Trp Lys Tyr Ala Leu Tyr Ser

195                      200                      205  
 Met Ile Thr Ile Phe Val Ser Ser Arg Val Thr Asp Ala Val Phe Thr  
     210                      215                      220  
 Lys Gln Lys Arg Met Gln Ala Met Ile Val Thr Asn His Pro Glu Lys  
     225                      230                      235                      240  
 Val Ile Glu Lys Ile His Lys Lys Leu His Arg Gly Ala Thr Met Ile  
                             245                      250                      255  
 His Asp Ala Glu Gly Thr Tyr Asn His Glu Arg Lys Ala Val Leu Ile  
                             260                      265                      270  
 Thr Val Ile Thr Arg Ala Glu Phe Asn Glu Phe Lys Gln Ile Met Thr  
                             275                      280                      285  
 Gln Val Asp Pro Ser Ser Phe Val Ser Val Ser Glu Asn Val His Ile  
     290                      295                      300  
 Leu Gly Arg Phe Val Glu Ile Asp Asn  
     305                      310

<210> 407  
 <211> 76  
 <212> PRT  
 <213> Streptococcus pneumoniae

<400> 407

Met Lys Arg Val Ile Leu Leu Ala Val Ile Gln Ala Val Val Leu Phe  
     1                      5                      10                      15  
 Phe Ile Ile Gly Ala Leu Ala Tyr Ala Phe Lys Gly Asp Phe Phe Tyr  
                             20                      25                      30  
 Asn Tyr Leu Ala Val Val Phe Ala Pro Ile Ala Gly Val Leu Arg Phe  
     35                      40                      45  
 Gly Thr Ala Tyr Ile Thr Glu Ile Val Leu Pro Arg Lys Ala Ala Glu  
     50                      55                      60  
 Ile Ala Glu Lys Arg Lys Ala Gly Lys Asn Ser Lys

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65                                70                                75

<210> 408
<211> 213
<212> PRT
<213> Streptococcus pneumoniae

<400> 408

Met Lys Leu Leu Lys Asn Leu Gly Trp Ile Leu Leu Ala Leu Leu Ser
1                               5                               10                               15

Phe Leu Phe Ile Tyr Gly Phe Ile Gln Gly Leu Ala Thr Ala Ser Leu
                20                               25                               30

Ala Leu Gly Ala Ser Pro Tyr Ala Val Thr Leu Leu Tyr Val Ala Leu
        35                               40                               45

Ala Gly Val Tyr Val Tyr Gly Ile Tyr Lys Trp Tyr Gln Lys Ala Pro
        50                               55                               60

Val His Ile Glu Lys Ser Gly Phe Asn Arg Phe Ile Trp Leu Pro Val
65                               70                               75                               80

Leu Val Trp Phe Leu Ser Leu Val Val Gln Phe Phe Leu Pro Asp Asp
                85                               90                               95

Pro Ser Val Asn Gln Gln Ile Ala Thr Asp Leu Thr Leu Ser Gln Pro
                100                               105                               110

Leu Phe Ser Phe Phe Ala Val Val Ile Phe Ala Pro Leu Thr Glu Glu
        115                               120                               125

Ile Val Phe Arg Gly Met Leu Ala Arg Tyr Leu Phe Pro Lys Gln Asp
        130                               135                               140

Asn Ser Lys Arg Thr Leu Ile Phe Leu Leu Val Ser Ser Leu Leu Phe
145                               150                               155                               160

Ala Leu Ile His Phe Pro Gly Asp Val Gln Gln Phe Phe Val Tyr Phe
                165                               170                               175

Ser Leu Gly Phe Ser Leu Gly Leu Ala Tyr Ile Ser Arg Lys Gly Leu

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180                                      185                                      190  
 Val Tyr Ser Ile Ser Leu His Ala Leu Asn Asn Leu Val Gly Phe Leu  
                  195                                      200                                      205  
  
 Met Ile Leu Met Leu  
                  210  
  
 <210> 409  
 <211> 226  
 <212> PRT  
 <213> Streptococcus pneumoniae  
  
 <400> 409  
  
 Met Gly Met Phe Val Gly Met Phe Lys Ala Arg Val Glu Ser His Glu  
 1                                      5                                      10                                      15  
  
 Ile Ile Leu Asp Val Lys Ala Leu Met Pro Trp Ile Ser Ala Ile Cys  
                  20                                      25                                      30  
  
 Leu Leu Ile Gly Phe Ile Ser Met Phe Leu Thr Phe Asn Phe Leu Lys  
                  35                                      40                                      45  
  
 Lys Ser Arg Lys Phe His Ser Leu Tyr Gln Glu Glu Met Asp Asp Asp  
                  50                                      55                                      60  
  
 Leu Asn Glu Thr Tyr Tyr Val Gln Met Tyr Arg Asn Leu Glu Phe Gly  
 65                                      70                                      75                                      80  
  
 Thr Ile Ala Phe Asn Ile Thr Gly Val Ala Ile Pro Leu Ala Ile Phe  
                  85                                      90                                      95  
  
 Ile Ser Leu Ser Glu Val Ile Ile Leu His Thr Asn Pro Gln Thr Phe  
                  100                                      105                                      110  
  
 Phe Leu Ser Phe Leu Leu Phe Val Val Phe Leu Val Ala Gln Lys Ser  
                  115                                      120                                      125  
  
 Leu Phe Lys Thr Ile Ala Ile Val Arg Gln Phe Asp Leu Glu Phe Phe  
                  130                                      135                                      140  
  
 Ala Thr Pro Lys Asp Val Leu Asn Tyr Ile Asn Ser Tyr Asp Glu Gly

145                      150                      155                      160  
 Glu Arg Gln Ala Asn Leu Glu Gln Ser Phe Arg Ile Leu Phe Gln Leu  
                                  165                                   170                                   175  
 His Gln Tyr Val Leu Pro Ala Leu Tyr Ile Phe Leu Ile Ile Ile Ser  
                                  180                                   185                                   190  
 Phe Leu Thr Gly Glu Ile Gln Leu Leu Ala Phe Leu Leu Val Gly Ala  
                                  195                                   200                                   205  
 Ile His Val Tyr Ile Asn Val Met Gln Leu Pro Met Val Lys Arg Tyr  
                                  210                                   215                                   220  
 Phe Lys  
 225  
  
 <210> 410  
 <211> 621  
 <212> PRT  
 <213> Streptococcus pneumoniae  
  
 <400> 410  
  
 Met Lys Lys Thr Thr Ile Leu Ser Leu Thr Thr Ala Ala Val Ile Leu  
 1                                   5                                   10                                   15  
  
 Ala Ala Tyr Val Pro Asn Glu Pro Ile Leu Ala Asp Thr Pro Ser Ser  
                                  20                                   25                                   30  
  
 Glu Val Ile Lys Glu Thr Lys Val Gly Ser Ile Ile Gln Gln Asn Asn  
                                  35                                   40                                   45  
  
 Ile Lys Tyr Lys Val Leu Thr Val Glu Gly Asn Ile Gly Thr Val Gln  
                                  50                                   55                                   60  
  
 Val Gly Asn Gly Val Thr Pro Val Glu Phe Glu Ala Gly Gln Asp Gly  
 65                                   70                                   75                                   80  
  
 Lys Pro Phe Thr Ile Pro Thr Lys Ile Thr Val Gly Asp Lys Val Phe  
                                  85                                   90                                   95  
  
 Thr Val Thr Glu Val Ala Ser Gln Ala Phe Ser Tyr Tyr Pro Asp Glu

100	105	110
Thr Gly Arg Ile Val Tyr Tyr	Pro Ser Ser Ile Thr	Ile Pro Ser Ser
115	120	125
Ile Lys Lys Ile Gln Lys Lys Gly Phe His Gly	Ser Lys Ala Lys Thr	
130	135	140
Ile Ile Phe Asp Lys Gly Ser Gln Leu Glu Lys Ile Glu Asp Arg Ala		
145	150	155
Phe Asp Phe Ser Glu Leu Glu Glu Ile Glu Leu Pro Ala Ser Leu Glu		
165	170	175
Tyr Ile Gly Thr Ser Ala Phe Ser Phe Ser Gln Lys Leu Lys Lys Leu		
180	185	190
Thr Phe Ser Ser Ser Ser Lys Leu Glu Leu Ile Ser His Glu Ala Phe		
195	200	205
Ala Asn Leu Ser Asn Leu Glu Lys Leu Thr Leu Pro Lys Ser Val Lys		
210	215	220
Thr Leu Gly Ser Asn Leu Phe Arg Leu Thr Thr Ser Leu Lys His Val		
225	230	235
Asp Val Glu Glu Gly Asn Glu Ser Phe Ala Ser Val Asp Gly Val Leu		
245	250	255
Phe Ser Lys Asp Lys Thr Gln Leu Ile Tyr Tyr Pro Ser Gln Lys Asn		
260	265	270
Asp Glu Ser Tyr Lys Thr Pro Lys Glu Thr Lys Glu Leu Ala Ser Tyr		
275	280	285
Ser Phe Asn Lys Asn Ser Tyr Leu Lys Lys Leu Glu Leu Asn Glu Gly		
290	295	300
Leu Glu Lys Ile Gly Thr Phe Ala Phe Ala Asp Ala Ile Lys Leu Glu		
305	310	315
		320

Glu Ile Ser Leu Pro Asn Ser Leu Glu Thr Ile Glu Arg Leu Ala Phe  
                                   325                                  330                                  335

Tyr Gly Asn Leu Glu Leu Lys Glu Leu Ile Leu Pro Asp Asn Val Lys  
                                   340                                  345                                  350

Asn Phe Gly Lys His Val Met Asn Gly Leu Pro Lys Leu Lys Ser Leu  
                                   355                                  360                                  365

Thr Ile Gly Asn Asn Ile Asn Ser Leu Pro Ser Phe Phe Leu Ser Gly  
                                   370                                  375                                  380

Val Leu Asp Ser Leu Lys Glu Ile His Ile Lys Asn Lys Ser Thr Glu  
                                   385                                  390                                  395                                  400

Phe Ser Val Lys Lys Asp Thr Phe Ala Ile Pro Glu Thr Val Lys Phe  
                                   405                                  410                                  415

Tyr Val Thr Ser Glu His Ile Lys Asp Val Leu Lys Ser Asn Leu Ser  
                                   420                                  425                                  430

Thr Ser Asn Asp Ile Ile Val Glu Lys Val Asp Asn Ile Lys Gln Glu  
                                   435                                  440                                  445

Thr Asp Val Ala Lys Pro Lys Lys Asn Ser Asn Gln Gly Val Val Gly  
                                   450                                  455                                  460

Trp Val Lys Asp Lys Gly Leu Trp Tyr Tyr Leu Asn Glu Ser Gly Ser  
                                   465                                  470                                  475                                  480

Met Ala Thr Gly Trp Val Lys Asp Lys Gly Leu Trp Tyr Tyr Leu Asn  
                                   485                                  490                                  495

Glu Ser Gly Ser Met Ala Thr Gly Trp Val Lys Asp Lys Gly Leu Trp  
                                   500                                  505                                  510

Tyr Tyr Leu Asn Glu Ser Gly Ser Met Ala Thr Gly Trp Val Lys Asp  
                                   515                                  520                                  525

Lys Gly Leu Trp Tyr Tyr Leu Asn Glu Ser Gly Ser Met Ala Thr Gly  
                                   530                                  535                                  540

Trp Val Lys Asp Lys Gly Leu Trp Tyr Tyr Leu Asn Glu Ser Gly Ser  
 545 550 555 560

Met Ala Thr Gly Trp Val Lys Asp Lys Gly Leu Trp Tyr Tyr Leu Asn  
 565 570 575

Glu Ser Gly Ser Met Ala Thr Gly Trp Val Thr Val Ser Gly Lys Trp  
 580 585 590

Tyr Tyr Thr Tyr Asn Ser Gly Asp Leu Leu Val Asn Thr Thr Thr Pro  
 595 600 605

Asp Gly Tyr Arg Val Asn Ala Asn Gly Glu Trp Val Gly  
 610 615 620

<210> 411

<211> 383

<212> PRT

<213> Streptococcus pneumoniae

<400> 411

Met Ala Ile Phe Tyr Val Pro Ala Val Asn Leu Ile Gly Lys Gly Val  
 1 5 10 15

Val Asn Glu Val Gly Pro Tyr Ile Lys Glu Leu Gly Tyr Lys Lys Ala  
 20 25 30

Leu Leu Val Thr Asp Lys Tyr Ile Glu Gly Ser Asp Ile Leu Pro Lys  
 35 40 45

Thr Leu Lys Pro Leu Asp Thr Glu Gly Ile Glu Tyr Val Ile Phe Ser  
 50 55 60

Asp Val Glu Pro Asn Pro Thr Cys Lys Asn Val Thr Asp Gly Val Ala  
 65 70 75 80

Ala Leu Gln Glu His Gly Cys Asp Phe Ile Ile Ser Leu Gly Gly Gly  
 85 90 95

Ser Pro Gln Asp Ala Ala Ser Cys Ile Ser Ile Met Ala Thr Asn Gly  
 100 105 110

Gly Lys Pro Gln Asp Tyr Glu Gly Leu His Lys Ser Ala Lys Lys Gly  
 115 120 125

Leu Pro Val Val Ala Ile Asn Thr Thr Ala Gly Thr Ser Ala Glu Ile  
 130 135 140

Thr Ile Asn Tyr Val Ile Thr Asp Glu Glu Arg Lys Val Lys Met Val  
 145 150 155 160

Met Val Asp Lys Asn Ser Leu Ala Leu Ile Ser Val Asn Asp Pro Glu  
 165 170 175

Leu Met Leu Ser Lys Pro Lys Gly Leu Thr Ala Ala Thr Gly Met Asp  
 180 185 190

Ala Leu Thr His Ala Val Glu Ala Leu Val Thr Pro Gly Ala Tyr Asp  
 195 200 205

Val Thr Lys Lys Leu Ser Ile Gly Ala Ile Glu Leu Ile Lys Glu Tyr  
 210 215 220

Leu Pro Arg Ala Val Glu Asn Gly His Asp Ile Glu Ala Arg Glu Gly  
 225 230 235 240

Met Val Asn Ala Ile Phe Leu Gly Gly Met Ser Phe Asn Asn Ala Gly  
 245 250 255

Leu Gly Tyr Val His Ser Met Ala His Gln Leu Gly Ala Val Tyr Asn  
 260 265 270

Leu Pro His Gly Val Cys Cys Ala Met Leu Leu Pro Val Ile Glu Arg  
 275 280 285

Glu Asn Ala Lys Arg Val Pro Glu Ala Phe Arg Asn Val Ala Lys Ala  
 290 295 300

Leu Gly Leu His Val Glu Gly Lys Ser Asp Gln Glu Cys Ala Asp Tyr  
 305 310 315 320

Ala Ile Ala Glu Ile Glu Lys Leu Ser Glu Thr Val Gly Ile Pro Lys  
 325 330 335

Lys Leu Thr Glu Leu Gly Ile Glu Glu Lys Asp Phe Asp Phe Glu Tyr  
 340 345 350

Leu Ser Lys Asn Ala Leu Ile Asp Ala Cys Ala Pro Gly Asn Pro Phe  
 355 360 365

Met Pro Thr Leu Glu Glu Thr Ile Ala Phe Tyr Lys Glu Leu Phe  
 370 375 380

<210> 412

<211> 257

<212> PRT

<213> Streptococcus pneumoniae

<400> 412

Met Ile Lys Asp Glu Arg Val Leu Glu Leu Ile Glu Ile Ile Lys Lys  
 1 5 10 15

Lys Lys Arg Ile Ala Val Lys Glu Leu Ala Glu Ile Thr Phe Ser Ser  
 20 25 30

Thr Ser Thr Leu Arg Arg Asp Leu Ile Phe Leu Glu Asn Gln Gly Leu  
 35 40 45

Ile Lys Arg Lys His Gly Tyr Val Thr Leu Ser Ser Met Asn Thr Ile  
 50 55 60

Glu Leu Ser His Gln Ile Arg Glu Gly Glu Ser Thr Arg Gln Lys Arg  
 65 70 75 80

Leu Ile Ala Ser Leu Ala Lys Asp Phe Ile Arg Ser Gly Met Cys Ile  
 85 90 95

Tyr Leu Asp Ser Ser Thr Thr Val Tyr Glu Leu Cys Pro Tyr Leu Ser  
 100 105 110

Glu Leu Asp Asn Leu Ile Ile Phe Thr Asn Gly Leu His Thr Ala Gln  
 115 120 125

Thr Leu Ser Glu Thr Val Lys Asp Ser Ser Lys Ile Phe Ile Thr Ser  
 130 135 140

Gly Glu Val Lys His Gln Ser Cys Ser Val Val Asn Tyr Asp Lys Glu  
 145 150 155 160

Asn Ser Leu Leu Asp His Phe Asn Ile Asp Leu Ala Phe Cys Ser Ala  
 165 170 175

Arg Gly Ile Asp Asp Gln Tyr Val Tyr Glu Ala Ser Leu Ser Gln Ala  
 180 185 190

Ile Ser Lys Lys Asn Ile Ile Asp Lys Ala His Glu Thr Ile Leu Leu  
 195 200 205

Ile Asp Ser Ser Lys Phe Tyr Lys Thr Gly Phe Phe Lys Ile Asn Pro  
 210 215 220

Leu Ser Lys Tyr Thr Thr Phe Ile Ser Asp Thr Val Pro Asp Gln Lys  
 225 230 235 240

Leu Leu Asp Ala Val Glu Leu Phe Asp Gly Glu Trp Val Ser Asp Ile  
 245 250 255

Gln

<210> 413  
 <211> 268  
 <212> PRT  
 <213> Streptococcus pneumoniae

<400> 413

Met Leu Ser Leu Leu Ser Tyr Asp Phe Ile Gln Arg Ala Phe Leu Ala  
 1 5 10 15

Val Ile Ala Met Ser Leu Phe Ser Pro Val Leu Gly Thr Phe Leu Ile  
 20 25 30

Leu Arg Arg Gln Ser Leu Met Ser Asp Thr Leu Ser His Val Ser Leu  
 35 40 45

Ser Gly Val Ala Phe Gly Leu Val Leu Gly Ile Ser Pro Thr Val Ser  
 50 55 60



Thr Ile Ala Ile Val Leu Ile Ala Ala Val Phe Leu Glu Tyr Leu Arg  
65 70 75 80

Thr Val Tyr Lys Ser Phe Met Glu Ile Gly Thr Ala Ile Leu Met Ser  
85 90 95

Thr Gly Leu Ala Val Ser Leu Ile Val Met Ser Lys Gly Lys Ser Ser  
100 105 110

Ser Ser Met Ser Leu Asp Gln Tyr Leu Phe Gly Ser Ile Val Thr Ile  
115 120 125

Ser Glu Glu Gln Val Ile Ser Leu Phe Val Ile Ala Ala Val Val Leu  
130 135 140

Ile Leu Thr Phe Leu Phe Leu Arg Pro Met Tyr Ile Leu Thr Phe Asp  
145 150 155 160

Glu Asp Thr Ala Phe Val Asp Gly Leu Pro Val Arg Thr Met Ser Ile  
165 170 175

Leu Phe Asn Met Val Thr Gly Val Ala Ile Ala Leu Met Ile Pro Ala  
180 185 190

Ala Gly Ala Leu Leu Val Ser Thr Ile Met Val Leu Pro Ala Ser Ile  
195 200 205

Ala Leu Arg Leu Gly Lys Asn Phe Lys Ser Val Met Leu Leu Ala Ser  
210 215 220

Ala Ile Gly Phe Leu Gly Met Val Ala Gly Leu Tyr Ile Ser Tyr Tyr  
225 230 235 240

Ala Glu Thr Pro Ala Ser Ala Ser Ile Thr Ile Ile Phe Val Thr Val  
245 250 255

Phe Ile Leu Ile Ser Leu Val Arg Arg Phe Ile Lys  
260 265

<210> 414

<211> 234  
 <212> PRT  
 <213> Streptococcus pneumoniae

<400> 414

Met Arg Tyr Ile Thr Val Glu Asp Leu Ser Phe Tyr Tyr Asp Lys Glu  
 1 5 10 15

Pro Val Leu Glu His Ile Asn Tyr Cys Val Asp Ser Gly Glu Phe Val  
 20 25 30

Thr Leu Thr Gly Glu Asn Gly Ala Ala Lys Thr Thr Leu Ile Lys Ala  
 35 40 45

Ser Leu Gly Ile Leu Gln Pro Arg Ile Gly Lys Val Ala Ile Ser Lys  
 50 55 60

Thr Asn Thr Gln Gly Lys Lys Leu Arg Ile Ala Tyr Leu Pro Gln Gln  
 65 70 75 80

Ile Ala Ser Phe Asn Ala Gly Phe Pro Ser Thr Val Tyr Glu Phe Val  
 85 90 95

Lys Ser Gly Arg Tyr Pro Arg Lys Gly Trp Phe Arg Arg Leu Asn Ala  
 100 105 110

His Asp Glu Glu His Ile Lys Ala Ser Leu Asp Ser Val Gly Met Trp  
 115 120 125

Glu His Arg Asp Lys Arg Leu Gly Ser Leu Ser Gly Gly Gln Lys Gln  
 130 135 140

Arg Ala Val Ile Ala Arg Met Phe Ala Ser Asp Pro Asp Val Phe Ile  
 145 150 155 160

Leu Asp Glu Pro Thr Thr Gly Met Asp Ala Gly Ser Lys Asn Glu Phe  
 165 170 175

Tyr Glu Leu Met His His Ser Ala His His His Gly Lys Ala Val Leu  
 180 185 190

Met Ile Thr His Asp Pro Glu Glu Val Lys Asp Tyr Ala Asp Arg Asn

195                      200                      205  
 Ile His Leu Val Arg Asn Gln Asp Ser Pro Trp Arg Cys Phe Asn Val  
     210                      215                      220  
  
 His Glu Asn Gly Gln Glu Val Gly His Ala  
     225                      230  
  
 <210> 415  
 <211> 516  
 <212> PRT  
 <213> Streptococcus pneumoniae  
  
 <400> 415  
  
 Met Ser Asn Lys Pro Ile Ala Asp Met Ile Glu Thr Ile Glu His Phe  
     1                      5                      10                      15  
  
 Ala Gln Thr Gln Pro Ser Tyr Pro Val Tyr Asn Val Leu Gly Gln Glu  
                     20                      25                      30  
  
 His Thr Tyr Gly Asp Leu Lys Ala Asp Ser Asp Ser Leu Ala Ala Val  
                     35                      40                      45  
  
 Ile Asp Gln Leu Gly Leu Pro Glu Lys Ser Pro Val Val Val Phe Gly  
     50                      55                      60  
  
 Gly Gln Glu Tyr Glu Met Leu Ala Thr Phe Val Ala Leu Thr Lys Ser  
     65                      70                      75                      80  
  
 Gly His Ala Tyr Ile Pro Ile Asp Ser His Ser Ala Leu Glu Arg Val  
                     85                      90                      95  
  
 Ser Ala Ile Leu Glu Val Ala Glu Pro Ser Leu Ile Ile Ala Ile Ser  
                     100                      105                      110  
  
 Ala Phe Pro Leu Glu Gln Val Ser Thr Pro Met Ile Asn Leu Ala Gln  
     115                      120                      125  
  
 Val Gln Glu Ala Phe Ala Gln Gly Asn Asn Tyr Glu Ile Thr His Pro  
     130                      135                      140  
  
 Val Lys Gly Asp Asp Asn Tyr Tyr Ile Ile Phe Thr Ser Gly Thr Thr

145		150		155		160									
Gly	Lys	Pro	Lys	Gly	Val	Gln	Ile	Ser	His	Asp	Asn	Leu	Leu	Ser	Phe
				165					170					175	
Thr	Asn	Trp	Met	Ile	Thr	Asp	Lys	Glu	Phe	Ala	Thr	Pro	Ser	Arg	Pro
			180					185					190		
Gln	Met	Leu	Ala	Gln	Pro	Pro	Tyr	Ser	Phe	Asp	Leu	Ser	Val	Met	Tyr
		195					200					205			
Trp	Ala	Pro	Thr	Leu	Ala	Leu	Gly	Gly	Thr	Leu	Phe	Thr	Leu	Pro	Ser
	210					215					220				
Val	Ile	Thr	Gln	Asp	Phe	Lys	Gln	Leu	Phe	Ala	Ala	Ile	Phe	Ser	Leu
225					230					235					240
Pro	Ile	Ala	Ile	Trp	Thr	Ser	Thr	Pro	Ser	Phe	Ala	Asp	Met	Ala	Met
				245					250					255	
Leu	Ser	Glu	Tyr	Phe	Asn	Ser	Glu	Lys	Met	Pro	Gly	Ile	Thr	His	Phe
			260					265					270		
Tyr	Phe	Asp	Gly	Glu	Glu	Leu	Thr	Val	Lys	Thr	Ala	Gln	Lys	Leu	Arg
		275					280					285			
Glu	Arg	Phe	Pro	Asn	Ala	Arg	Ile	Ile	Asn	Ala	Tyr	Gly	Pro	Thr	Glu
	290					295					300				
Ala	Thr	Val	Ala	Leu	Ser	Ala	Val	Ala	Val	Thr	Asp	Glu	Met	Leu	Ala
305					310					315				320	
Thr	Leu	Lys	Arg	Leu	Pro	Ile	Gly	Tyr	Thr	Lys	Ala	Asp	Ser	Pro	Thr
				325					330					335	
Phe	Ile	Ile	Asp	Glu	Glu	Gly	Asn	Lys	Leu	Pro	Asn	Gly	Glu	Gln	Gly
			340					345					350		
Glu	Ile	Ile	Val	Ser	Gly	Pro	Ala	Val	Ser	Lys	Gly	Tyr	Met	Asn	Asn
		355					360					365			

Pro Glu Lys Thr Ala Glu Ala Phe Phe Glu Phe Glu Asp Leu Pro Ala  
 370 375 380

Tyr His Thr Gly Asp Val Gly Thr Met Thr Asp Glu Gly Leu Leu Leu  
 385 390 395 400

Tyr Gly Gly Arg Met Asp Phe Gln Ile Lys Phe Asn Gly Tyr Arg Ile  
 405 410 415

Glu Leu Glu Asp Val Ser Gln Asn Leu Asn Lys Ser Arg Phe Ile Glu  
 420 425 430

Ser Ala Val Ala Val Pro Arg Tyr Asn Lys Asp His Lys Val Gln Asn  
 435 440 445

Leu Leu Ala Tyr Val Ile Leu Lys Asp Gly Val Arg Glu Gln Phe Glu  
 450 455 460

Arg Asp Ile Asp Ile Thr Lys Ala Ile Lys Glu Asp Leu Thr Asp Ile  
 465 470 475 480

Met Met Ser Tyr Met Met Pro Ser Lys Phe Leu Tyr Arg Asp Ser Leu  
 485 490 495

Pro Leu Thr Pro Asn Gly Lys Ile Asp Ile Lys Gly Leu Ile Asn Glu  
 500 505 510

Val Asn Lys Arg  
 515

<210> 416  
 <211> 131  
 <212> PRT  
 <213> Streptococcus pneumoniae

<400> 416

Met Met Ser Leu Val His Asn Ile Ile Glu Asp Gly Asp Thr Glu Ser  
 1 5 10 15

Leu Ile Arg Lys Tyr Leu His Ser Gly Val Ile Ile Asn Gly Gln Arg  
 20 25 30

Tyr Lys Thr Leu Val Gly Thr Pro Gln Gly Gly Asn Leu Ser Pro Leu  
           35                          40                          45

Leu Ser Asn Ile Met Leu Asn Glu Leu Asp Lys Glu Leu Glu Lys Arg  
       50                          55                          60

Gly Leu Arg Phe Val Arg Tyr Ala Asp Asp Cys Val Ile Thr Val Gly  
   65                          70                          75                          80

Ser Glu Ala Ala Ser Lys Arg Val Met Tyr Ser Val Ser Arg Phe Ile  
                           85                          90                          95

Glu Lys Arg Leu Gly Leu Lys Val Asn Met Thr Lys Arg Val Glu Ile  
                           100                          105                          110

Ser Arg Phe Trp Val Leu Glu Ile Ile Arg Trp Leu Glu Lys Pro Ser  
           115                          120                          125

Thr Ser Arg  
       130

<210> 417

<211> 137

<212> PRT

<213> Streptococcus pneumoniae

<400> 417

Met Ser Lys Leu Leu Asp Lys Ile Leu Ser Arg Glu Asn Met Leu Glu  
   1                          5                          10                          15

Ala Tyr Asn Gln Val Lys Ser Asn Lys Gly Ser Ala Gly Ile Asp Gly  
           20                          25                          30

Met Thr Ile Glu Glu Met Asp Asn Tyr Leu Arg Gln Asn Trp Arg Leu  
           35                          40                          45

Thr Lys Glu Leu Ile Lys Gln Arg Lys Tyr Lys Pro Gln Pro Val Leu  
       50                          55                          60

Arg Val Glu Ile Pro Lys Pro Asp Gly Gly Ile Arg Gln Leu Gly Ile  
   65                          70                          75                          80

Pro Thr Val Met Asp Arg Met Ile Gln Gln Ala Ile Val Gln Val Met  
85 90 95

Ser Pro Ile Cys Glu Pro His Phe Ser Asp Thr Ser Tyr Gly Phe Arg  
100 105 110

Pro Asn Arg Ser Cys Glu Lys Ala Ile Met Lys Leu Leu Glu Tyr Leu  
115 120 125

Asn Asp Gly Tyr Glu Trp Ile Val Asp  
130 135

<210> 418

<211> 164

<212> PRT

<213> Streptococcus pneumoniae

<400> 418

Met Arg Gln Leu Lys Arg Val Gly Val Phe Leu Leu Leu Pro Phe Phe  
1 5 10 15

Val Leu Ile Asp Ala His Ile Ser Gln Leu Leu Gly Ser Phe Phe Pro  
20 25 30

His Val His Leu Ala Ser His Phe Leu Phe Leu Phe Leu Phe Glu  
35 40 45

Thr Ile Glu Val Ser Glu Tyr Leu Tyr Leu Val Tyr Cys Phe Val Ile  
50 55 60

Gly Leu Val Tyr Asp Val Tyr Phe Phe His Leu Ile Gly Ile Thr Thr  
65 70 75 80

Leu Leu Phe Ile Leu Leu Gly Ala Phe Leu His Lys Leu Asn Ser Val  
85 90 95

Ile Leu Leu Asn Arg Trp Thr Arg Met Leu Ala Met Ile Val Leu Thr  
100 105 110

Phe Leu Phe Glu Met Gly Ser Tyr Leu Leu Ala Phe Met Val Gly Leu  
115 120 125

Thr Val Asp Ser Met Ser Ile Phe Ile Val Tyr Ser Leu Val Pro Thr  
 130 135 140

Met Ile Leu Asn Phe Leu Trp Ile Thr Val Phe Gln Phe Ile Phe Glu  
 145 150 155 160

Lys Tyr Tyr Leu

<210> 419

<211> 427

<212> PRT

<213> Streptococcus pneumoniae

<400> 419

Met Thr Lys Val Val Phe Glu Glu Lys Tyr Tyr Pro Ala Val Lys Glu  
 1 5 10 15

Met Val Tyr Arg Thr Arg Leu Ala Asn Gly Leu Thr Val Ala Leu Leu  
 20 25 30

Pro Lys Lys Glu Phe Lys Glu Val Tyr Gly Ser Val Thr Val Gln Phe  
 35 40 45

Gly Ser Val Asp Thr Phe Val Thr Glu Val Asp Gly Asp Val Lys Gln  
 50 55 60

Tyr Pro Gly Gly Ile Ala His Phe Leu Glu His Lys Leu Phe Glu Arg  
 65 70 75 80

Glu Asp Ser Ser Asp Leu Met Ser Ala Phe Thr Ser Leu Gly Ala Asp  
 85 90 95

Ser Asn Ala Phe Thr Ser Phe Thr Lys Thr Asn Tyr Leu Phe Ser Ala  
 100 105 110

Thr Asp Tyr Phe Leu Glu Asn Leu Asp Leu Leu Asp Glu Leu Val Thr  
 115 120 125

Ser Ala His Phe Thr Glu Ala Ser Ile Leu Thr Glu Gln Asp Ile Ile  
 130 135 140



Gln Gln Glu Arg Glu Met Tyr Gln Asp Asp Pro Asp Ser Cys Leu Phe  
 145 150 155 160

Phe Ser Thr Leu Ala Asn Leu Tyr Pro Gly Thr Pro Leu Ala Thr Asp  
 165 170 175

Ile Val Gly Ser Glu Glu Ser Ile Ser Gln Ile Asn Leu Thr Asn Leu  
 180 185 190

Gln Glu Asn Phe Thr Lys Phe Tyr Lys Pro Val Asn Met Ser Leu Phe  
 195 200 205

Leu Val Gly Asn Phe Asp Val Glu Arg Val Gln Asp Tyr Phe Glu Ser  
 210 215 220

Lys Glu Leu Lys Asp Ser Asp Phe Gln Glu Val Ala Arg Glu Lys Leu  
 225 230 235 240

Phe Leu Gln Pro Val Lys Pro Thr Asp Ser Met Arg Met Glu Val Ser  
 245 250 255

Ser Pro Lys Leu Ala Ile Gly Val Arg Gly Lys Arg Glu Val Ser Glu  
 260 265 270

Ala Asp Cys Tyr Arg His His Ile Leu Leu Lys Leu Leu Phe Ala Met  
 275 280 285

Met Phe Gly Trp Thr Ser Asp Arg Phe Gln Lys Cys Tyr Glu Ser Gly  
 290 295 300

Lys Ile Asp Ala Ser Leu Ser Leu Glu Val Glu Ile Thr Ser Arg Phe  
 305 310 315 320

His Phe Val Met Leu Thr Met Asp Thr Lys Glu Pro Val Ala Leu Ser  
 325 330 335

His Gln Phe Arg Lys Ala Ile Arg Asn Phe Thr Lys Asp Leu Asp Ile  
 340 345 350

Thr Glu Glu His Leu Asp Ile Ile Lys Arg Glu Met Phe Gly Glu Phe  
 355 360 365

Phe Ser Ser Met Asn Ser Leu Glu Phe Ile Ala Thr Gln Tyr Asp Ala  
 370 375 380

Phe Glu Asn Gly Glu Ile Ile Phe Asp Leu Pro Lys Ile Leu Gln Glu  
 385 390 395 400

Ile Thr Leu Glu Asp Val Leu Asp Ala Gly His His Leu Ile Asp Asp  
 405 410 415

Gly Asp Ile Val Asp Phe Thr Ile Phe Pro Ser  
 420 425

<210> 420  
 <211> 540  
 <212> PRT  
 <213> Streptococcus pneumoniae

<400> 420

Met Leu Thr Val Ser Asp Val Ser Leu Arg Phe Ser Asp Arg Lys Leu  
 1 5 10 15

Phe Asp Asp Val Asn Ile Lys Phe Thr Glu Gly Asn Thr Tyr Gly Leu  
 20 25 30

Ile Gly Ala Asn Gly Ala Gly Lys Ser Thr Phe Leu Lys Ile Leu Ala  
 35 40 45

Gly Asp Ile Glu Pro Thr Thr Gly His Ile Ser Leu Gly Pro Asp Glu  
 50 55 60

Arg Leu Ser Val Leu Arg Gln Asn His Phe Asp Tyr Glu Asp Glu Arg  
 65 70 75 80

Ala Ile Asp Val Val Ile Met Gly Asn Glu Lys Leu Tyr Ser Ile Met  
 85 90 95

Lys Glu Lys Asp Ala Ile Tyr Met Lys Glu Asp Phe Ser Asp Glu Asp  
 100 105 110

Gly Val Arg Ala Ala Glu Leu Glu Gly Glu Phe Ala Glu Leu Gly Gly  
 115 120 125

Trp Glu Ala Glu Ser Glu Ala Ser Gln Leu Leu Gln Asn Leu Asn Ile  
 130 135 140

Pro Glu Glu Leu His Tyr Gln Asn Met Ser Glu Leu Ala Asn Gly Glu  
 145 150 155 160

Lys Val Lys Val Leu Leu Ala Lys Ala Leu Phe Gly Lys Pro Asp Val  
 165 170 175

Leu Leu Leu Asp Glu Pro Thr Asn Gly Leu Asp Ile Gln Ser Ile Thr  
 180 185 190

Trp Leu Glu Asp Phe Leu Ile Asp Phe Asp Asn Thr Val Ile Val Val  
 195 200 205

Ser His Asp Arg His Phe Leu Asn Lys Val Cys Thr His Met Ala Asp  
 210 215 220

Leu Asp Phe Gly Lys Ile Lys Leu Tyr Val Gly Asn Tyr Asp Phe Trp  
 225 230 235 240

Lys Glu Ser Ser Glu Leu Ala Ala Lys Leu Leu Ala Asp Arg Asn Ala  
 245 250 255

Lys Ala Glu Glu Lys Ile Lys Gln Leu Gln Glu Phe Val Ala Arg Phe  
 260 265 270

Ser Ala Asn Ala Ser Lys Ser Arg Gln Ala Thr Ser Arg Lys Lys Met  
 275 280 285

Leu Asp Lys Ile Glu Leu Glu Glu Ile Val Pro Ser Ser Arg Lys Tyr  
 290 295 300

Pro Phe Ile Asn Phe Lys Ala Glu Arg Glu Ile Gly Asn Asp Leu Leu  
 305 310 315 320

Thr Val Glu Asn Leu Thr Val Lys Ile Asp Gly Glu Thr Ile Leu Asp  
 325 330 335

Asn Ile Ser Phe Ile Leu Arg Pro Asp Asp Lys Thr Ala Leu Ile Gly  
 340 345 350

Gln Asn Asp Ile Gln Thr Thr Ala Leu Ile Arg Ala Ile Met Gly Asp  
 355 360 365

Ile Asp Tyr Glu Gly Thr Val Lys Trp Gly Val Thr Thr Ser Gln Ser  
 370 375 380

Tyr Leu Pro Lys Asp Asn Ser Ala Asp Phe Ala Gly Gly Glu Ser Ile  
 385 390 395 400

Leu Asp Trp Leu Arg Gln Phe Ala Ser Lys Glu Glu Asp Asp Asn Thr  
 405 410 415

Phe Leu Arg Gly Phe Leu Gly Arg Met Leu Phe Ser Gly Asp Glu Val  
 420 425 430

Asn Lys Pro Val Asn Val Leu Ser Gly Gly Glu Lys Val Arg Val Met  
 435 440 445

Leu Ser Lys Leu Met Leu Leu Lys Ser Asn Val Leu Val Leu Asp Asp  
 450 455 460

Pro Thr Asn His Leu Asp Leu Glu Ser Ile Ser Ser Leu Asn Asp Gly  
 465 470 475 480

Leu Lys Asn Phe Lys Glu Ser Ile Ile Phe Ala Ser His Asp His Glu  
 485 490 495

Phe Ile Gln Thr Leu Ala Asn His Ile Ile Val Leu Ser Lys Asn Gly  
 500 505 510

Val Ile Asp Arg Ile Asp Glu Thr Tyr Asp Glu Phe Leu Glu Asn Ala  
 515 520 525

Glu Val Gln Ala Lys Val Lys Glu Leu Trp Lys Asp  
 530 535 540

<210> 421

<211> 850

<212> PRT

<213> Streptococcus pneumoniae

&lt;400&gt; 421

Met Lys Ser Phe Leu Lys Thr Tyr Arg Thr Tyr Phe Ile Ser Phe Ile  
 1 5 10 15

Ile Pro Val Val Ile Met Ser Gly Val Tyr Leu Ser Gln Ser Ile Tyr  
 20 25 30

Trp Asn Ser Asp Asn Ser Pro Leu Leu Gly Asp Gly Phe His Gln Tyr  
 35 40 45

Val Ile Phe Asp Val Ala Leu Arg Asn Ile Leu His Gly Asn Ser Asn  
 50 55 60

Leu Phe Tyr Thr Phe Thr Ser Gly Leu Gly Leu Asn Phe Tyr Ala Leu  
 65 70 75 80

Ser Ser Tyr Tyr Leu Gly Ser Phe Leu Ala Pro Leu Val Tyr Phe Phe  
 85 90 95

Asp Leu Thr Asn Met Pro Asp Ala Ile Tyr Leu Thr Thr Leu Leu Lys  
 100 105 110

Phe Gly Leu Ile Gly Leu Ser Thr Phe Phe Ser Leu Asn Lys Leu Phe  
 115 120 125

Gln Ser Ile Pro Gln Ile Leu Lys Leu Ala Leu Ser Thr Ser Tyr Ala  
 130 135 140

Leu Met Ser Phe Thr Val Ser Gln Leu Glu Ile Lys Thr Trp Leu Asp  
 145 150 155 160

Val Phe Ile Leu Ile Pro Leu Ile Ile Thr Gly Leu His Leu Leu Ile  
 165 170 175

Thr Glu Lys Lys Leu Leu Leu Tyr Phe Thr Ser Leu Ser Ile Leu Phe  
 180 185 190

Ile Gln Asn Tyr Tyr Phe Gly Tyr Met Thr Val Leu Phe Leu Ile Phe  
 195 200 205

Trp Tyr Leu Cys Gln Ile Ser Trp Asp Phe Lys Thr Arg Lys Ser Ser

210		215		220
Val Leu Asp Phe Ile Val Ile Ser Phe Leu Ala Gly Met Ala Ser Leu				
225		230		235 240
Ile Met Thr Leu Pro Thr Leu Phe Asp Leu Gln Thr His Gly Glu Lys				
	245		250	255
Leu Thr Glu Val Thr Lys Phe Gln Thr Glu Ser Ser Trp Tyr Leu Asp				
	260		265	270
Leu Phe Ala Lys Gln Phe Ile Gly Ser Phe Asp Thr Thr Lys Tyr Gly				
	275		280	285
Ala Ile Pro Met Ile Phe Val Gly Leu Phe Pro Phe Ile Leu Thr Ile				
	290		295	300
Leu Phe Phe Thr Leu Lys Ser Ile Lys Phe His Val Lys Leu Ile Tyr				
305		310		315 320
Val Ile Phe Phe Ala Phe Leu Ile Ala Ser Phe Tyr Ile Glu Ala Leu				
	325		330	335
Asp Leu Phe Trp Gln Gly Met His Thr Pro Asn Met Phe Leu His Arg				
	340		345	350
Tyr Ala Trp Ile Phe Ser Thr Leu Leu Ile Tyr Thr Ala Ala Glu Val				
	355		360	365
Leu Lys Arg Leu Lys Glu Leu Lys Val Trp Asn Phe Leu Val Ser Leu				
	370		375	380
Phe Leu Val Val Ala Gly Phe Leu Ala Thr Ile Tyr Leu Lys Ser His				
385		390		395 400
Tyr Ser Phe Leu Thr Asp Leu Asn Ile Leu Leu Thr Leu Glu Phe Leu				
	405		410	415
Val Val Tyr Ser Leu Leu Leu Leu Ala Val Ile Lys Lys Phe Ile Ser				
	420		425	430

Val Asn Leu Phe Ala Ile Leu Ile Ser Leu Phe Ile Leu Val Glu Met  
 435 440 445

Ser Leu Asn Ala Ser Ser Gln Met Asp Gly Ile Ala Lys Glu Trp Gly  
 450 455 460

Phe Ala Ser Arg Ser Ala Tyr Ser Arg Asp Ile Pro Ala Met Glu Ser  
 465 470 475 480

Phe Ser Thr Tyr Ile Gly Asn Gln Phe Thr Arg Thr Glu Lys Leu Gln  
 485 490 495

Thr Gln Thr Gly Asn Asp Ser Met Lys Phe Asn Tyr Asn Gly Ile Ser  
 500 505 510

Gln Phe Ser Ser Val Arg Asn Arg Ser Ser Ser Ser Thr Leu Asp Lys  
 515 520 525

Leu Gly Phe Lys Ser Ser Gly Thr Asn Leu Asn Leu Arg Tyr Ala Asn  
 530 535 540

Asn Ser Ile Leu Ala Asp Ser Leu Phe Gly Ile Gln Tyr Asn Ile Ser  
 545 550 555 560

Asp Ser Pro Ile Asp Lys Tyr Gly Phe Lys Asp Ile Tyr Gln Lys Asp  
 565 570 575

Asn Leu Thr Leu Tyr Glu Asn Gln Tyr Ser Leu Pro Ile Ala Val Ala  
 580 585 590

Ser Gln Ser Val Tyr Asn Asp Val Lys Phe Asn Glu His Thr Leu Asp  
 595 600 605

Asn Gln Ala Ser Phe Leu Asn Gln Leu Ala Asn Val Asn Phe Asp Tyr  
 610 615 620

Phe Ser Pro Ile Pro Tyr Glu Lys Thr Glu Lys Ile Glu Asn Thr Asn  
 625 630 635 640

Asp Leu Ile Ser Val Thr Ser Ser Ser Asn Glu Asp Ala Ala Ile Gln  
 645 650 655

Tyr Gln Ile Glu Val Pro Glu Asn Ser Gln Val Tyr Leu Ser Phe Ile  
 660 665 670

Asn Leu His Phe Ser Asn Asp Lys Gln Lys Lys Val Asp Ile Leu Val  
 675 680 685

Asn Gly Glu Lys Lys Thr Phe Thr Thr Asp Asn Val Phe Ser Phe Phe  
 690 695 700

Asn Leu Gly Tyr Thr Lys Glu Lys Lys Thr Phe Asn Ile Asn Val Ser  
 705 710 715 720

Phe Pro Gly Asn Ser Gln Val Ser Phe Glu Ser Pro Thr Phe Tyr Arg  
 725 730 735

Leu Asp Thr Lys Thr Phe Thr Glu Ala Ile Gln Lys Ile Lys Glu Gln  
 740 745 750

Pro Val Thr Val Ser Thr Ser Lys Asn Lys Val Phe Ala Thr Tyr Asp  
 755 760 765

Val Gln Gln Asp Thr Ser Ile Phe Phe Thr Ile Pro Tyr Asp Lys Gly  
 770 775 780

Trp Ser Ala Tyr Gln Asp Gly Lys Lys Ile Glu Ile Lys Gln Ala Gln  
 785 790 795 800

Thr Gly Phe Met Lys Val Asp Ile Pro Lys Gly Lys Gly Thr Ile Thr  
 805 810 815

Leu Ser Phe Ile Pro Asn Gly Phe Ile Thr Gly Ala Ile Cys Ser Phe  
 820 825 830

Thr Ser Leu Leu Leu Phe Gly Ile Tyr Asn His Arg Arg Lys Ser Ser  
 835 840 845

Lys Ala  
 850

<210> 422

<211> 250



&lt;212&gt; PRT

&lt;213&gt; Streptococcus pneumoniae

&lt;400&gt; 422

Met Lys Val Leu Ile Leu Glu Asp Val Ile Glu His Gln Val Arg Leu  
 1 5 10 15

Glu Arg Ile Leu Asp Glu Ile Ser Lys Glu Ser Asn Ile Pro Ile Ser  
 20 25 30

Tyr Lys Thr Thr Gly Lys Val Arg Glu Phe Glu Glu Tyr Ile Glu Asn  
 35 40 45

Asp Glu Val Asn Gln Leu Tyr Phe Leu Asp Ile Asp Ile His Gly Ile  
 50 55 60

Glu Lys Lys Gly Phe Glu Val Ala Gln Leu Ile Arg His Tyr Asn Pro  
 65 70 75 80

Tyr Ala Ile Ile Val Phe Ile Thr Ser Arg Ser Glu Phe Ala Thr Leu  
 85 90 95

Thr Tyr Lys Tyr Gln Val Ser Ala Leu Asp Phe Val Asp Lys Asp Ile  
 100 105 110

Asn Asp Glu Met Phe Lys Lys Arg Ile Glu Gln Asn Ile Phe Tyr Thr  
 115 120 125

Lys Ser Met Leu Leu Glu Asn Glu Asp Val Val Asp Tyr Phe Asp Tyr  
 130 135 140

Asn Tyr Lys Gly Asn Asp Leu Lys Ile Pro Tyr His Asp Ile Leu Tyr  
 145 150 155 160

Ile Glu Thr Thr Gly Val Ser His Lys Leu Arg Ile Ile Gly Lys Asn  
 165 170 175

Phe Ala Lys Glu Phe Tyr Gly Thr Met Thr Asp Ile Gln Glu Lys Asp  
 180 185 190

Lys His Thr Gln Arg Phe Tyr Ser Pro His Lys Ser Phe Leu Val Asn  
 195 200 205

Ile Gly Asn Ile Arg Glu Ile Asp Arg Lys Asn Leu Glu Ile Val Phe  
 210 215 220

Tyr Glu Asp His Arg Cys Pro Ile Ser Arg Leu Lys Ile Arg Lys Leu  
 225 230 235 240

Lys Asp Ile Leu Glu Lys Lys Ser Gln Lys  
 245 250

<210> 423

<211> 441

<212> PRT

<213> Streptococcus pneumoniae

<400> 423

Met Asp Leu Leu Gly Phe Gly Thr Val Ile Val His Phe Leu Ile Ile  
 1 5 10 15

Ser His Ser Tyr Arg Leu Ile Cys Lys Gly Arg Ile Asn Arg Lys Glu  
 20 25 30

Leu Tyr Val Phe Gly Ala Tyr Thr Leu Leu Thr Glu Ile Val Leu Glu  
 35 40 45

Phe Ser Phe Tyr Leu Leu Tyr Leu Asp Lys Ile Gly Ile Glu Arg Phe  
 50 55 60

Leu Phe Pro Leu Gly Leu Tyr Ser Tyr Phe Arg Trp Met Lys Gln Tyr  
 65 70 75 80

Glu Arg Asp Arg Gly Leu Phe Leu Ser Leu Leu Leu Ser Leu Leu Tyr  
 85 90 95

Glu Ser Thr His Asn Phe Leu Ser Val Ile Phe Ser Ser Ile Thr Gly  
 100 105 110

Asp Asn Phe Val Leu Gln Tyr His Phe Pro Phe Phe Phe Val Val Thr  
 115 120 125

Val Leu Thr Tyr Phe Val Thr Leu Lys Ile Ile Tyr Tyr Phe His Leu  
 130 135 140

Glu Leu Ala Tyr Phe Asp Lys Asp Tyr Leu Tyr Pro Phe Leu Lys Lys  
 145 150 155 160

Val Phe Phe Ala Leu Leu Leu His Ile Val Ser Phe Val Ser Asp  
 165 170 175

Met Val Ser Thr Ile Lys His Leu Asn Ser Phe Gly Ser Ile Leu Ser  
 180 185 190

Ser Ile Val Phe Ile Ser Leu Leu Leu Thr Phe Phe Ala Met Asn Ser  
 195 200 205

His Lys Val Gln Met Glu Lys Glu Ile Ala Leu Lys Gln Lys Lys Phe  
 210 215 220

Glu Gln Lys His Leu Gln Asn Tyr Thr Asp Glu Ile Val Gly Leu Tyr  
 225 230 235 240

Asn Glu Ile Arg Gly Phe Arg His Asp Tyr Ala Gly Met Leu Val Ser  
 245 250 255

Met Gln Met Ala Ile Asp Ser Gly Asn Leu Gln Glu Ile Asp Arg Ile  
 260 265 270

Tyr Asn Glu Val Leu Val Lys Ala Asn His Lys Leu Arg Ser Asp Lys  
 275 280 285

Tyr Thr Tyr Phe Asp Leu Asn Asn Ile Glu Asp Ser Ala Leu Arg Ser  
 290 295 300

Leu Val Ala Gln Ser Ile Val Tyr Ala Arg Asn Asn Gly Val Glu Phe  
 305 310 315 320

Thr Leu Glu Val Lys Asp Thr Ile Thr Lys Leu Pro Ile Glu Leu Leu  
 325 330 335

Asp Leu Val Arg Ile Met Ser Val Leu Leu Asn Asn Ala Val Glu Gly  
 340 345 350

Ser Ala Asp Ser Tyr Lys Lys Gln Met Glu Val Ala Val Ile Lys Met

355                                      360                                      365  
 Glu Thr Glu Thr Val Ile Val Ile Gln Asn Ser Cys Lys Met Thr Met  
     370                                      375                                      380  
 Thr Pro Ser Gly Asp Leu Phe Ala Leu Gly Phe Ser Thr Lys Gly Arg  
     385                                      390                                      395                                      400  
 Asn Arg Gly Val Gly Leu Asn Asn Val Lys Glu Leu Leu Asp Lys Tyr  
                                     405                                      410                                      415  
 Asn Asn Ile Ile Leu Glu Thr Glu Met Glu Gly Ser Thr Phe Arg Gln  
                                     420                                      425                                      430  
 Ile Ile Arg Phe Lys Arg Glu Phe Glu  
                                     435                                      440  
 <210> 424  
 <211> 122  
 <212> PRT  
 <213> Streptococcus pneumoniae  
 <400> 424  
 Met Ser Lys Asn Ile Val Gln Leu Asn Asn Ser Phe Ile Gln Asn Glu  
     1                                      5                                      10                                      15  
 Tyr Gln Arg Arg Arg Tyr Leu Met Lys Glu Arg Gln Lys Arg Asn Arg  
                                     20                                      25                                      30  
 Phe Met Gly Gly Val Leu Ile Leu Ile Met Leu Leu Phe Ile Leu Pro  
                                     35                                      40                                      45  
 Thr Phe Asn Leu Ala Gln Ser Tyr Gln Gln Leu Leu Gln Arg Arg Gln  
     50                                      55                                      60  
 Gln Leu Ala Asp Leu Gln Thr Gln Tyr Gln Thr Leu Ser Asp Glu Lys  
     65                                      70                                      75                                      80  
 Asp Lys Glu Thr Ala Phe Ala Thr Lys Leu Lys Asp Glu Asp Tyr Ala  
                                     85                                      90                                      95  
 Ala Lys Tyr Thr Arg Ala Lys Tyr Tyr Tyr Ser Lys Ser Arg Glu Lys

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                100                105                110

Val Tyr Thr Ile Pro Asp Leu Leu Gln Arg
    115                120

<210> 425
<211> 420
<212> PRT
<213> Streptococcus pneumoniae

<400> 425

Met Glu Glu Val Glu Val Ala Glu Val Lys Asn Ala Arg Val Ser Leu
 1              5              10              15

Thr Gly Glu Lys Thr Lys Pro Met Lys Leu Ala Glu Val Thr Ser Ile
    20              25              30

Asn Val Asn Arg Thr Lys Thr Glu Met Glu Glu Phe Asn Arg Val Leu
    35              40              45

Gly Gly Gly Val Val Pro Gly Ser Leu Val Leu Ile Gly Gly Asp Pro
 50              55              60

Gly Ile Gly Lys Ser Thr Leu Leu Leu Gln Val Ser Thr Gln Leu Ser
 65              70              75              80

Gln Val Gly Thr Val Leu Tyr Val Ser Gly Glu Glu Ser Ala Gln Gln
    85              90              95

Ile Lys Leu Arg Ala Glu Arg Leu Gly Asp Ile Asp Ser Glu Phe Tyr
    100              105              110

Leu Tyr Ala Glu Thr Asn Met Gln Ser Val Arg Ala Glu Val Glu Arg
    115              120              125

Ile Gln Pro Asp Phe Leu Ile Ile Asp Ser Ile Gln Thr Ile Met Ser
    130              135              140

Pro Glu Ile Ser Gly Val Gln Gly Ser Val Ser Gln Val Arg Glu Val
    145              150              155              160

Thr Ala Glu Leu Met Gln Leu Ala Lys Thr Asn Asn Ile Ala Ile Phe

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				165					170					175			
Ile	Val	Gly	His	Val	Thr	Lys	Glu	Gly	Thr	Leu	Ala	Gly	Pro	Arg	Met		
			180					185					190				
Leu	Glu	His	Met	Val	Asp	Thr	Val	Leu	Tyr	Phe	Glu	Gly	Glu	Arg	His		
		195					200					205					
His	Thr	Phe	Arg	Ile	Leu	Arg	Ala	Val	Lys	Asn	Arg	Phe	Gly	Ser	Thr		
	210					215					220						
Asn	Glu	Ile	Gly	Ile	Phe	Glu	Met	Gln	Ser	Gly	Gly	Leu	Val	Glu	Val		
225					230					235						240	
Leu	Asn	Pro	Ser	Gln	Val	Phe	Leu	Glu	Glu	Arg	Leu	Asp	Gly	Ala	Thr		
				245					250					255			
Gly	Ser	Ser	Ile	Val	Val	Thr	Met	Glu	Gly	Thr	Arg	Pro	Ile	Leu	Ala		
			260					265					270				
Glu	Val	Gln	Ala	Leu	Val	Thr	Pro	Thr	Met	Phe	Gly	Asn	Ala	Lys	Arg		
		275					280					285					
Thr	Thr	Thr	Gly	Leu	Asp	Phe	Asn	Arg	Ala	Ser	Leu	Ile	Met	Ala	Val		
	290					295					300						
Leu	Glu	Lys	Arg	Ala	Gly	Leu	Leu	Leu	Gln	Asn	Gln	Asp	Ala	Tyr	Leu		
305					310					315					320		
Lys	Ser	Ala	Gly	Gly	Val	Lys	Leu	Asp	Glu	Pro	Ala	Ile	Asp	Leu	Ala		
				325					330					335			
Val	Ala	Val	Ala	Ile	Ala	Ser	Ser	Tyr	Lys	Asp	Lys	Pro	Thr	Asn	Pro		
			340					345					350				
Gln	Glu	Cys	Phe	Val	Gly	Glu	Leu	Gly	Leu	Thr	Gly	Glu	Ile	Arg	Arg		
		355					360					365					
Val	Asn	Arg	Ile	Glu	Gln	Arg	Ile	Asn	Glu	Ala	Ala	Lys	Leu	Gly	Phe		
	370					375					380						

Thr Lys Ile Tyr Val Pro Lys Asn Ser Leu Thr Gly Ile Thr Leu Pro  
 385 390 395 400

Lys Glu Ile Gln Val Ile Gly Val Thr Thr Ile Gln Glu Val Leu Lys  
 405 410 415

Lys Val Phe Ala  
 420

<210> 426

<211> 207

<212> PRT

<213> Streptococcus pneumoniae

<400> 426

Met Pro Lys Lys Val Leu Ile Leu Ser Leu Leu Gly Gly Met Phe Leu  
 1 5 10 15

Ser Gly Trp Leu Ser Ser Phe Ala Asn Thr Tyr Ile His Asp Leu Leu  
 20 25 30

Gly Val Leu Phe Pro Asp Ser Pro Phe Leu Asn Ala Phe Glu Ser Ala  
 35 40 45

Ile Ala Ala Pro Leu Val Glu Glu Pro Leu Lys Leu Leu Ser Leu Val  
 50 55 60

Phe Val Leu Ala Leu Ile Pro Val Arg Lys Leu Lys Ser Leu Phe Leu  
 65 70 75 80

Leu Gly Ile Ala Ser Gly Leu Gly Phe Gln Met Ile Lys Asp Ile Gly  
 85 90 95

Tyr Ile Arg Thr Asp Leu Pro Glu Gly Phe Asp Phe Thr Ile Ser Arg  
 100 105 110

Ile Leu Glu Arg Ile Ile Ser Gly Ile Ala Ser His Trp Thr Phe Ser  
 115 120 125

Gly Leu Ala Val Val Gly Val Tyr Leu Leu Tyr Arg Ala Tyr Lys Gly  
 130 135 140

Gln Lys Val Gly Lys Lys Gln Gly Leu Ile Phe Leu Gly Leu Ala Leu  
 145 150 155 160

Gly Thr His Phe Leu Phe Asn Ser Pro Phe Val Glu Leu Glu Thr Glu  
 165 170 175

Leu Pro Leu Ala Ile Pro Val Val Thr Ala Ile Ala Leu Tyr Gly Phe  
 180 185 190

Tyr His Ala Tyr Cys Phe Val Glu Lys His Asn Glu Leu Met Thr  
 195 200 205

<210> 427

<211> 717

<212> PRT

<213> Streptococcus pneumoniae

<400> 427

Met Lys Phe Gly Lys Arg His Tyr Arg Pro Gln Val Asp Gln Met Asp  
 1 5 10 15

Cys Gly Val Ala Ser Leu Ala Met Val Phe Gly Tyr Tyr Gly Ser Tyr  
 20 25 30

Tyr Phe Leu Ala His Leu Arg Glu Leu Ala Lys Thr Thr Met Asp Gly  
 35 40 45

Thr Thr Ala Leu Gly Leu Val Lys Val Ala Glu Glu Ile Gly Phe Glu  
 50 55 60

Thr Arg Ala Ile Lys Ala Asp Met Thr Leu Phe Asp Leu Pro Asp Leu  
 65 70 75 80

Thr Phe Pro Phe Val Ala His Val Leu Lys Glu Gly Lys Leu Leu His  
 85 90 95

Tyr Tyr Val Val Thr Gly Gln Asp Lys Asp Ser Ile His Ile Ala Asp  
 100 105 110

Pro Asp Pro Gly Val Lys Leu Thr Lys Leu Pro Arg Glu Arg Phe Glu  
 115 120 125



Glu Glu Trp Thr Gly Val Thr Leu Phe Met Ala Pro Ser Pro Asp Tyr  
 130 135 140

Lys Pro His Lys Glu Gln Lys Asn Gly Leu Leu Ser Phe Ile Pro Ile  
 145 150 155 160

Leu Val Lys Gln Arg Gly Leu Ile Ala Asn Ile Val Leu Ala Thr Leu  
 165 170 175

Leu Val Thr Val Ile Asn Ile Val Gly Ser Tyr Tyr Leu Gln Ser Ile  
 180 185 190

Ile Asp Thr Tyr Val Pro Asp Gln Met Arg Ser Thr Leu Gly Ile Ile  
 195 200 205

Ser Ile Gly Leu Val Ile Val Tyr Ile Phe Gln Gln Ile Leu Ser Tyr  
 210 215 220

Ala Gln Glu Tyr Leu Leu Leu Val Leu Gly Gln Arg Leu Ser Ile Asp  
 225 230 235 240

Val Ile Leu Ser Tyr Ile Lys His Val Phe His Leu Pro Met Ser Phe  
 245 250 255

Phe Ala Thr Arg Arg Thr Gly Glu Ile Val Ser Arg Phe Thr Asp Ala  
 260 265 270

Asn Ser Ile Ile Asp Ala Leu Ala Ser Thr Ile Leu Ser Ile Phe Leu  
 275 280 285

Asp Val Ser Thr Val Val Ile Ile Ser Leu Val Leu Phe Ser Gln Asn  
 290 295 300

Thr Asn Leu Phe Phe Met Thr Leu Leu Ala Leu Pro Ile Tyr Thr Val  
 305 310 315 320

Ile Ile Phe Ala Phe Met Lys Pro Phe Glu Lys Met Asn Arg Asp Thr  
 325 330 335

Met Glu Ala Asn Ala Val Leu Ser Ser Ser Ile Ile Glu Asp Ile Asn  
 340 345 350

Gly Ile Glu Thr Ile Lys Ser Leu Thr Ser Glu Ser Gln Arg Tyr Gln  
 355 360 365

Lys Ile Asp Lys Glu Phe Val Asp Tyr Leu Lys Lys Ser Phe Thr Tyr  
 370 375 380

Ser Arg Ala Glu Ser Gln Gln Lys Ala Leu Lys Lys Val Ala His Leu  
 385 390 395 400

Leu Leu Asn Val Gly Ile Leu Trp Met Gly Ala Val Leu Val Met Asp  
 405 410 415

Gly Lys Met Ser Leu Gly Gln Leu Ile Thr Tyr Asn Thr Leu Leu Val  
 420 425 430

Tyr Phe Thr Asn Pro Leu Glu Asn Ile Ile Asn Leu Gln Thr Lys Leu  
 435 440 445

Gln Thr Ala Gln Val Ala Asn Asn Arg Leu Asn Glu Val Tyr Leu Val  
 450 455 460

Ala Ser Glu Phe Glu Glu Lys Lys Thr Val Glu Asp Leu Ser Leu Met  
 465 470 475 480

Lys Gly Asp Met Thr Phe Lys Gln Val His Tyr Lys Tyr Gly Tyr Gly  
 485 490 495

Arg Asp Val Leu Ser Asp Ile Asn Leu Thr Val Pro Gln Gly Ser Lys  
 500 505 510

Val Ala Phe Val Gly Ile Ser Gly Ser Gly Lys Thr Thr Leu Ala Lys  
 515 520 525

Met Met Val Asn Phe Tyr Asp Pro Ser Gln Gly Glu Ile Ser Leu Gly  
 530 535 540

Ser Val Asn Leu Asn Gln Ile Asp Lys Lys Ala Leu Arg Gln Tyr Ile  
 545 550 555 560

Asn Tyr Leu Ser Gln Gln Pro Tyr Val Phe Asn Gly Thr Ile Leu Glu  
 565 570 575

Asn Leu Leu Leu Gly Ala Lys Glu Gly Thr Thr Gln Glu Asp Ile Leu  
 580 585 590

Arg Ala Val Glu Leu Ala Glu Ile Arg Glu Asp Ile Glu Arg Met Pro  
 595 600 605

Leu Asn Tyr Gln Thr Glu Leu Thr Ser Asp Gly Ala Gly Ile Ser Gly  
 610 615 620

Gly Gln Arg Gln Arg Ile Ala Leu Ala Arg Ala Leu Leu Thr Asp Ala  
 625 630 635 640

Pro Val Leu Ile Leu Asp Glu Ala Thr Ser Ser Leu Asp Ile Leu Thr  
 645 650 655

Glu Lys Arg Ile Val Asp Asn Leu Ile Ala Leu Asp Lys Thr Leu Ile  
 660 665 670

Phe Ile Ala His Arg Leu Thr Ile Ala Glu Arg Thr Glu Lys Val Val  
 675 680 685

Val Leu Asp Gln Gly Lys Ile Val Glu Glu Gly Lys His Ala Asp Leu  
 690 695 700

Leu Ala Gln Gly Gly Phe Tyr Ala His Leu Val Asn Ser  
 705 710 715

<210> 428

<211> 319

<212> PRT

<213> Streptococcus pneumoniae

<400> 428

Met Asp Ile Lys Ile Lys Arg Glu Glu Ile Met Lys Lys Phe Ser Lys  
 1 5 10 15

Thr Leu Arg Asp Asn Trp Ile Phe Leu Leu Met Val Leu Pro Gly Ala  
 20 25 30

Leu Trp Leu Ile Leu Phe Phe Tyr Ile Pro Val Phe Gly Asn Val Val  
 35 40 45

Ala Phe Lys Asp Tyr His Met Thr Ser Asn Gly Phe Ile Asp Ser Ile  
 50 55 60

Ile Asn Ser Lys Trp Val Gly Leu Asp Asn Phe Arg Phe Leu Phe Ser  
 65 70 75 80

Ser Arg Asp Ala Phe Ile Ile Thr Arg Asn Thr Val Leu Tyr Asn Leu  
 85 90 95

Gly Phe Ile Phe Leu Gly Leu Val Val Ser Val Gly Ile Ala Ile Ile  
 100 105 110

Leu Ser Glu Leu Arg Ser Lys Arg Met Val Lys Ile Phe Gln Thr Ser  
 115 120 125

Met Leu Phe Pro Tyr Phe Leu Ser Trp Val Ile Ile Ser Phe Phe Thr  
 130 135 140

Asp Ala Phe Leu Asn Ile Asp Lys Gly Val Phe Asn His Leu Leu Glu  
 145 150 155 160

Ser Leu Gly Leu Lys Glu Val Asn Phe Tyr Ala Asp Leu Gly Ile Trp  
 165 170 175

Pro Tyr Leu Leu Leu Phe Leu Gly Ile Trp Lys Gly Phe Gly Tyr Ser  
 180 185 190

Ser Val Met Tyr Tyr Ala Thr Ile Met Gly Ile Asp Pro Thr Tyr Tyr  
 195 200 205

Glu Ala Ala Thr Val Asp Gly Ala Ser Lys Trp Gln Arg Ile Arg Asn  
 210 215 220

Val Thr Ile Pro Gln Leu Thr Pro Leu Val Thr Val Leu Thr Ile Leu  
 225 230 235 240

Ala Val Gly Asn Ile Phe Arg Ala Asp Phe Gly Leu Phe Tyr Gln Ile  
 245 250 255

Pro His Asn Ala Gly Gln Leu Tyr Asn Val Thr Asn Val Leu Asp Val

260                                      265                                      270  
 Tyr Val Phe Asn Gly Leu Thr Gln Thr Ala Asp Ile Gly Met Ala Ala  
           275                                      280                                      285  
 Ala Ala Gly Leu Tyr Gln Ser Val Val Gly Leu Ile Leu Val Ile Leu  
           290                                      295                                      300  
 Ser Asn Leu Leu Ala Arg Arg Val Asp Pro Asn Ser Ala Leu Phe  
 305                                      310                                      315  
  
 <210> 429  
 <211> 388  
 <212> PRT  
 <213> Streptococcus pneumoniae  
  
 <400> 429  
 Met Lys Lys Gln Ser Leu Phe Phe Val Pro Gly Ile Ile Leu Ile Gly  
 1                                      5                                      10                                      15  
 Val Ser Leu Arg Thr Pro Phe Thr Val Leu Pro Ile Ile Leu Gly Asn  
           20                                      25                                      30  
 Ile Ser Gln Gly Leu Glu Val Glu Val Ser Ser Leu Gly Val Leu Thr  
           35                                      40                                      45  
 Ser Leu Pro Leu Leu Met Phe Thr Leu Phe Ser Pro Phe Ser Thr Gln  
           50                                      55                                      60  
 Leu Ala Gln Lys Ile Gly Leu Glu His Leu Phe Thr Tyr Ser Leu Phe  
 65                                      70                                      75                                      80  
 Phe Leu Thr Ile Gly Ser Leu Ile Arg Leu Ile Asn Leu Pro Leu Leu  
           85                                      90                                      95  
 Tyr Leu Gly Thr Leu Met Val Gly Ala Ser Val Ala Val Ile Asn Val  
           100                                      105                                      110  
 Leu Leu Pro Ser Leu Ile Gln Ala Asn Gln Pro Lys Lys Ile Gly Phe  
           115                                      120                                      125  
 Leu Thr Thr Leu Tyr Val Thr Ser Met Gly Ile Ala Thr Ala Leu Ala

130		135		140
Ser Tyr Leu Ala Val	Pro Ile Thr Gln Ala	Ser Ser Trp Lys Gly Leu		
145	150	155		160
Ile Leu Leu Leu Thr	Leu Leu Cys Leu Ala Thr Phe Leu Val Trp Leu			
	165	170		175
Pro Asn His Arg Tyr Asn His Arg	Leu Ala Pro Gln Thr Lys Gln Lys			
	180	185		190
Ser Gln Ile Lys Val Met Arg Asn Lys Gln Val Trp Ala Ile Ile Ile				
	195	200		205
Phe Ser Gly Phe Gln Ser Leu Ile Phe Tyr Thr Val Met Thr Trp Leu				
	210	215		220
Pro Thr Met Ser Ile His Ala Gly Leu Ser Ser His Glu Ala Gly Leu				
	225	230		235
Leu Thr Ser Ile Leu Ser Leu Ile Ser Ile Pro Phe Ser Met Thr Ile				
	245	250		255
Pro Ser Leu Thr Thr Ser Leu Ser Thr Arg Asn Arg Gln Leu Met Leu				
	260	265		270
Thr Leu Val Ser Leu Ala Gly Val Val Gly Ile Ser Met Leu Phe Phe				
	275	280		285
Pro Ile Asn Asn Phe Ile Tyr Trp Leu Ala Ile His Leu Leu Ile Gly				
	290	295		300
Thr Ala Thr Ser Ala Leu Phe Pro Tyr Leu Met Val Asn Phe Ser Leu				
	305	310		315
Lys Thr Ser Ala Pro Glu Lys Thr Ala Gln Leu Ser Gly Leu Ser Gln				
	325	330		335
Thr Gly Gly Tyr Ile Leu Ala Ala Phe Gly Pro Thr Leu Phe Gly Tyr				
	340	345		350

Ser Phe Asp Leu Phe His Ser Trp Val Pro Ser Val Ala Ala Leu Leu  
 355 360 365

Leu Ile Asp Ile Leu Met Thr Val Ala Leu Phe Thr Val Asp Arg Ala  
 370 375 380

Asp Lys Ile Leu  
 385

<210> 430  
 <211> 150  
 <212> PRT  
 <213> Streptococcus pneumoniae

<400> 430

Met Asp Phe Leu Phe Ala Ala Gly Ala Phe Gly Leu Val Ile Ala Asn  
 1 5 10 15

Asn Ala Ser Ile Ser Gly Ala Glu Gly Gly Cys Gln Ala Glu Val Gly  
 20 25 30

Ser Ala Ser Ala Met Ser Ala Ala Ala Leu Thr Leu Ala Ala Gly Gly  
 35 40 45

Thr Pro Tyr Gln Ala Ser Gln Ala Ile Ala Phe Val Ile Lys Asn Met  
 50 55 60

Leu Gly Leu Ile Cys Asp Pro Val Ala Gly Leu Val Glu Val Pro Cys  
 65 70 75 80

Val Lys Arg Asn Ala Met Gly Ala Ser Phe Ala Phe Ile Ala Ala Asp  
 85 90 95

Met Ala Leu Ala Gly Ile Glu Ser Lys Ile Pro Val Asp Glu Val Ile  
 100 105 110

Asp Ala Met Tyr Gln Val Gly Ala Ser Met Pro Thr Ala Phe Arg Glu  
 115 120 125

Thr Ala Glu Gly Gly Leu Ala Thr Thr Pro Thr Gly Arg Arg Leu Gln  
 130 135 140

Lys Glu Ile Phe Gly Glu  
145 150

<210> 431  
<211> 663  
<212> DNA  
<213> Streptococcus pneumoniae

<400> 431  
ggaagtagtt ttatgaatat agcagtaatt ggtttggggc atgttgggct ggcctacgcg 60  
ttactatattg catctaaata taaagttggt gcatatgata tagattctgt aaaaataaat 120  
aatttaaaaa agggcattct tccatctaaa aatgaagagc ttatgaagtt tttttgcgag 180  
aataacttaa atattacttt ttttgatata ttttctgaaa ttaaaaataa tattgattat 240  
tatattattg cgcttccgac agattatgat gagaaaattg gtagttttta tacatatgaa 300  
atcgaacaaa cggtatcgaa gattctgagg gtaaaccta atggaaagat tattttaaag 360  
tcaacagttc cgatcggtt ttcaaacaaa ttaaaaaggc tgtttgatac aaaaaatc 420  
atttttgtcc ctgaattttt gagagaaggc tgttctatat atgataattt atatccaagt 480  
cgcatagttg ttggagatga gacagttgaa ggaagaaaaa ttgcagagtt gttcctttcg 540  
attagtactc atagtactgc caatattaaa aatgttatgt tagtttctcc tactgaagca 600  
gaagcaatta agcttttttc taacacattc ttagctctcc gtgttgcttt ttaaatgaac 660  
tag 663

<210> 432  
<211> 708  
<212> DNA  
<213> Streptococcus pneumoniae

<400> 432  
aaaatgggtc taagaggagt tcctatgtct caaattgatc tacaaaaatt aactaagaaa 60  
aaccaagagt ttgtccacat tgctacccaa caattcatca aagatgggaa aacagacgct 120  
gaaatccaga ctatttttga ggaagtcatt ccccaaatcc ttgaggagca atctaaaggc 180  
acaactgccc gttccctata cggcgaccca actcattggg ctcatagctt cactgtcaaa 240  
gagcagtacg aaaaagagca tccaaaagaa aatgatgacc caaaactgat gattatggac 300  
tcagctcttt tcatcactag cctctttgcc cttgtcagcg ccttcacaac cttctttgcg 360  
gcagaccaag ctttcggcta tggattgatt actcttctat tagttggact ggttggtgga 420



ttgaccttct acttgatgta ctactttggt taccaatact atggaccaga tatggatcgc 480  
 agtcaacgtc cacctttctg gaaatctgta ctagttatcc tagcttctat gttcctttgg 540  
 ttgcttgtct tctttgcaac aagcttccta ccagctagcc ttaaccagct actggatcca 600  
 ttgccactag ctattattgg agcagccctc ctagcccttc gcttctatct caagaaacgc 660  
 ttgaatatcc gtagtgcaag tgcaggacca acacgctatc aagaataa 708

<210> 433  
 <211> 960  
 <212> DNA  
 <213> Streptococcus pneumoniae

<400> 433  
 gaaaggataa gggatatgaa acaagttttt ctctctacaa caactgaatt taaagagatc 60  
 gatacgcttg aaccgggtac ttggatcaat ctcgtaac cgaactcaaaa tgaatcactc 120  
 gaaatcgcca acaccttcga tattgatatt gctgaccttc gagcaccgct cgatgcggaa 180  
 gaaatgtctc gtattaccat tgaagacgag tataccctga ttatcgtaga cgtgccggtc 240  
 acggaggaaa gaaataaccg cacctactac gtaaccatcc cgcttggtat tatcatcact 300  
 gaggaacca ttatcactac gtgtttggaa ccactacctg tccttgatgt ctttatcaac 360  
 cgtcgattgc gtaatttcta taccttcatg cgttcacggt ttatctttca aattctttat 420  
 cgcaatgcag agctttacct aacagccctt cgttcaatcg accgcaagag tgaacaaatc 480  
 gaaagtcaac tgcataatc aactcgtaat gaagaattga ttgagctcat ggaattggaa 540  
 aaaactatcg tctatttcaa ggcctccctc aaaacaaatg agcgcgatg taagaaattg 600  
 accagttcaa ccagcaatat caagaaatac cttgaggacg aagacctgct tgaagacacc 660  
 ctgattgaaa cccaacaggc catcgagatg gcagatattt atggaaacgt cttgcattct 720  
 atgacagaga cctttgcctc tatcatttct aacaaccaga acaacatcat gaaaaccttg 780  
 gcccttgtga ccacgtcat gtccatccca accatggtct tttctgccta cgggatgaac 840  
 ttttaaggata atgaaatccc cctaaacgga gagccaaatg ccttctgggt aatcgtcttt 900  
 atgcgctttg ctatgagtgt ctgctcact ctctatctca tcataaaaa atggttctaa 960

<210> 434  
 <211> 330  
 <212> DNA  
 <213> Streptococcus pneumoniae

<400> 434  
 atagacgaaa aggagaaaaa gatggcaaac aaaaaaatcc gtatccgttt gaaagcttac 60  
 gaacaccgta cgcttgacac agcggctgca aaaatcgtag aatcagctac tcgtacaggt 120  
 gcacaagttg cgggtccaat cccacttcca actgaacgta gcctctacac aatcattcgt 180  
 gcgactcaca aatacaaaaga ctctcgcgaa caatttgaaa tgcgtacaca caaacgtttg 240  
 atcgatatcg ttaacccaac tcaaaaaaca gttgatgcct tgatgaaatt ggatcttcca 300  
 agtgggtgtaa acgtagaaat caaactttaa 330

<210> 435  
 <211> 645  
 <212> DNA  
 <213> Streptococcus pneumoniae

<400> 435  
 aaaaggaact attttctcat gacaaaagga atcttaggga aaaaagtggg aatgactcaa 60  
 atcttcactg aagctggcga attgatccct gtaacagtta ttgaagcaac tccaaacgtt 120  
 gttcttcaag ttaaaactgt tgaaacagac ggatacaacg ctatccaagt tggtttcgat 180  
 gacaaacgcg aagtattgag caacaaacct gctaaaggac atgtagcgaa agctaacacg 240  
 gctcctaagc gcttcattcg tgaattcaaa aacggtgaag gcttgggaagt tgggtgctgaa 300  
 attacagttg aaacattcgc agctggagac gttggtgacg taacgggtac ttctaaaggt 360  
 aaaggtttcc aagggtgttat caaacgccac ggacaatcac gtggaccaat ggctcacggg 420  
 tctcgttacc accgtcgtec aggttctatg gggcctgttg cacctaaccg cgtattcaaa 480  
 ggtaaaaacc ttgcaggacg tatgggtggc gaccgcgtaa caattcaaaa ccttgaagtt 540  
 gtacaagttg ttccagaaaa gaacgttatc cttatcaaag gtaacgtacc aggtgctaag 600  
 aaatctctta tcactatcaa atcagcagtt aaagctggta aataa 645

<210> 436  
 <211> 645  
 <212> DNA  
 <213> Streptococcus pneumoniae

<400> 436  
 agaaagggga aatcagtcac aatggcaaac gtaacattat ttgaccaaac tggtaaagaa 60  
 gctggccaag ttgttcttag cgatgcagta tttggtatcg aaccaaata gaacagttgtg 120  
 tttgatgtaa tcacagcca acgcgcaagc cttcgtcaag gaacacacgc tgttaaaaac 180

cgctctgcag tatcaggtgg tggacgcaaa ccatggcgctc aaaaaggaac tggacgtgct 240  
 cgtcaagggt ctatccgctc accacaatgg cgtgggtgggtg gtgttgtctt cggaccaact 300  
 ccacgttcat acggctacaa acttccacaa aaagttcgctc gcctagctct taaatcagtt 360  
 tactctgaaa aagttgctga aaacaaattc gtagctgtag acgctctttc atttacagct 420  
 ccaaaaactg ctgaatttgc aaaagttctt gcagcattga gcatcgattc taaagttctt 480  
 gttatccttg aagaaggaaa tgaattcgca gctctttcag ctcgtaacct tccaaacgtg 540  
 aaagttgcaa ctgctacaac tgcaagtgtt cttgacatcg caaatagcga caaacttctt 600  
 gtcacacaag cagctatctc taaaatcgag gaggttcttg cataa 645

<210> 437  
 <211> 318  
 <212> DNA  
 <213> Streptococcus pneumoniae

<400> 437  
 aatcgaggag gttcttgcac aatgaatttg tatgatgtta tcaaaaaacc tgtcatcact 60  
 gaaagctcaa tggctcaact tgaagcagga aaatatgtat ttgaagttga cactcgtgca 120  
 cacaaacttt tgatcaagca agctgttgaa gctgctttcg aaggtgttaa agttgccaat 180  
 gttaacacaa tcaacgtaaa accaaaagct aaacgtgttg gacgttacac tggttttact 240  
 aacaaaacta aaaaagctat catcacactt acagctgatt ctaaagcaat cgagttgttt 300  
 gctgctgaag ctgaataa 318

<210> 438  
 <211> 846  
 <212> DNA  
 <213> Streptococcus pneumoniae

<400> 438  
 ggaggaaata tcgtgggaat tcgtgtttat aaaccaacaa caaacggctc cgttaatatg 60  
 acttcttttg atttcgctga aatcacaaca agcactcctg aaaaatcatt gcttggtgca 120  
 ttgaagagca aggctggctg taacaacaac ggtcgtatca cagttcgtca ccaaggtggt 180  
 ggacacaaac gtttctaccg tttggttgac ttcaaacgta ataaagacaa cgttgaagca 240  
 gttgttaaaa caatcgagta cgatccaaac cgttctgcaa acatcgctct tgtacactac 300  
 actgacggtg tgaaagcata catcatcgct ccaaaaggct ttgaagtagg tcaacgtatc 360  
 gtttcaggctc cagaagcaga tatcaaagtc ggaaacgctc ttccacttgc taacatccca 420

gttgggtactt tgattcacia catcgagttg aaaccaggtc gtggtggtga attggtacgt 480  
gctgctgggtg catctgctca agtattgggt tctgaaggta aatatgttct tgttcgtctt 540  
caatcagggtg aagtctgtat gattcttggg acttgccgtg ctacagttgg tgttgctcga 600  
aacgaacaac atggacttgt aaaccttggg aaagcaggac gtagccgttg gaaaggatc 660  
cgcccaacag ttcgtgggtc tgtaatgaac cctaacgac acccacacgg tgggtggtgaa 720  
ggtaaagcac cagttgggtc taaagcacca tctactccat ggggcaaacc tgctcttggg 780  
cttaaaactc gtaacaagaa agcgaaatct gacaaactta tcgttcgtcg tcgcaacgag 840  
aaataa 846

<210> 439  
<211> 366  
<212> DNA  
<213> Streptococcus pneumoniae

<400> 439  
gcaactagta aatccgccag ctcggtagcg ctccatagga gtgcaagccg ctgtggtaca 60  
acatttaaag gagaaaatat aaaaatggga cgcagtctta aaaaaggacc tttcgtcgat 120  
gagcatttga tgaaaaaagt tgaagctcaa gctaacgacg aaaagaaaaa agttattaaa 180  
acttgggtcac gtcgttcaac gatcttccca agtttcattg gttacactat tgcagtttat 240  
gacggacgta aacacgtacc tgtttacatc caagaagaca tggtaggcca caaacttggg 300  
gaatttgcac caactcgtac ttacaaaggt cagcgtgcag acgacaagaa aacacgtaga 360  
aaataa 366

<210> 440  
<211> 345  
<212> DNA  
<213> Streptococcus pneumoniae

<400> 440  
atggcagaaa ttacttcagc taaagcaatg gctcgtacag tacgtgtttc acctcgtaaa 60  
tcacgtcttg ttcttgataa catccgtggg aaaagcgtag ccgatgcaat cgcaatcttg 120  
acattcactc caaacaagc tgctgaaatc atcttgaaag ttttgaaact agctgtagct 180  
aacgctgaaa acaactttgg tttggataaa gctaacttgg tagtatctga agcattcgca 240  
aacgaaggac caactatgaa acgtttccgt ccacgtgcga aagggttcagc ttcaccaatc 300

aacaaacgta cagctcacat cactgtagct gttgcagaaa aataa 345

<210> 441

<211> 666

<212> DNA

<213> Streptococcus pneumoniae

<400> 441

ggaggtaaaa tcgtgggtca aaaagtacat ccaattggta tgcgtgtcgg catcatccgt 60  
gattgggatg ccaaattggta tgctgaaaaa gaatacgcgg attaccttca tgaagatctt 120  
gcaatccgta aattcggttca aaaagaactt gctgacgcag cagtttcaac tattgaaatc 180  
gaacgcgcag taaacaaagt taacgtttca cttcacactg ctaaaccagg tatggttatc 240  
ggtaaagggtg gtgctaacgt tgatgcactc cgtgcaaaac ttaacaaatt gactggaaaa 300  
caagtacaca tcaacatcat cgaaatcaaa caacctgatt tggatgctca ccttgtaggt 360  
gaaggaattg ctcgtaatt ggagcaacgt gttgctttcc gtcgtgcaca aaaacaagca 420  
atccaacgtg caatgcgtgc tggagctaaa ggaatcaaaa ctcaagtatc aggtcgtttg 480  
aacgggtgcag atatcgcccg tgctgaagga tactctgaag gaactgttcc gcttcacaca 540  
cttcgtgcag atatcgatta cgcttgggaa gaagcagata ctacatacgg taaacttggt 600  
gttaaagtat ggatctaccg tggatgaagtt cttccagctc gtaaaaacac taaaggaggt 660  
aataa 666

<210> 442

<211> 384

<212> DNA

<213> Streptococcus pneumoniae

<400> 442

aaggagaaaa ctgaaatgat tcaaacagaa actcgtttga aagtcgcaga caacagcgggt 60  
gctcgcgaaa tcttgactat caaagttctt ggtgggttcag gacgtaaatt tgcaaacatc 120  
ggtgatgtta tcgtggcatc tgtaaaacaa gctactcctg gtggtgcgggt taaaaaagggt 180  
gacgttggtta aagcagttat cgttcgact aaatcagggt ctcgtcgtgc tgatggttca 240  
tacatcaaat ttgacgaaaa cgcagcagtt atcatccgtg aagacaaaac tcctcgcgga 300  
acacgtatct ttggcccagt tgcacgtgaa ttgcgtgaag gtggcttcat gaagatcgtg 360  
tcacttgctc cagaagtact ttaa 384

<210> 443  
 <211> 327  
 <212> DNA  
 <213> Streptococcus pneumoniae

<400> 443  
 gaaaaatcaa ggagaaacct aatgtttgta aaaaaaggcg acaaagttcg cgtaatcgct 60  
 ggtaaagata agggaaacaga agctgttgct cttactgccc ttccaaaagt aaacaaagtt 120  
 atcgttgaag gtgttaacat tgttaagaaa caccaacgtc caactaacga gcttcctcaa 180  
 ggtggtatca tcgagaaaga agcagctatc cacgtatcaa acgttcaagt tttggacaaa 240  
 aatggtgtag ctggctggtg tggatacaaa tttgtagacg gtaaaaaagt tcgctacaac 300  
 aaaaaatcag gcgaagtgtc tgattaa 327

<210> 444  
 <211> 570  
 <212> DNA  
 <213> Streptococcus pneumoniae

<400> 444  
 ttaatcacga aggaaaggag aagtataatg gcaaatacgtt taaaagaaaa atatcttaat 60  
 gaagtagttc ctgctttgac agaacaattc aactactcat cagtgatggc tgtgcctaaa 120  
 gtagataaga ttgttttgaa catgggtgtt ggtgaagctg tatcaaacgc taaaagcctt 180  
 gaaaaagctg ctgaagaatt ggcaactatc tcagggtcaaa aaccacttat cactaaagct 240  
 aaaaaatcaa tcgccggctt ccgtcttcgt gaagggtgtg cgatcgggtc aaaagttacc 300  
 cttcgtgggtg aacgtatgta cgaattcttg gataaattgg tatcagtttc acttccacgt 360  
 gtacgtgact tccacgggtg cccaacaaaa tcatttgatg gacgcgggaa ctacacactt 420  
 ggtgtgaaag aacaattaat cttcccagaa atcaacttcg atgacgttga caaaactcgt 480  
 ggtcttgaca tcgttatcgt aacaactgct aacactgacg aagagtcacg tgcattgctt 540  
 acaggccttg gaatgccttt tgcaaaataa 570

<210> 445  
 <211> 414  
 <212> DNA  
 <213> Streptococcus pneumoniae

<400> 445  
 gaggagaaaa acaaaatggt tatgactgac ccaatcgag acttcctaac tcgtattcgt 60  
 aatgctaacc aagctaaaca cgaagtactt gaagtacctg catcaaacaat caaaaaaggg 120

attgctgaaa tccttaaacg cgaagggttt gtaaaaaacg ttgaaatcat tgaagatgac 180  
 aaacaaggcg tcatccgtgt atttcttaaa tacggaccaa atggtgagaa agttatcact 240  
 aacttgaaac gtgtttctaa accaggactt cgtgtctaca aaaaacgtga agaccttcca 300  
 aaagtcttta acggacttgg aattgccatc ctttcaactt ctgaaggttt gcttactgat 360  
 aaagaagcac gccaaaagaa tggtgggtgt gaggttatcg cttacgtttg gtaa 414

<210> 446  
 <211> 552  
 <212> DNA  
 <213> Streptococcus pneumoniae

<400> 446  
 caggagaaaa taaacatgtc acgtattggt aataaagtta tcgtgttgcc tgctgggtgtt 60  
 gaactcgcta acaatgacaa cgttgtaact gtaaaaggat ctaaaggaga acttactcgt 120  
 gagttctcaa aagatattga aatccgtgtg gaaggactg aaataactct tcaccgtcca 180  
 aacgattcaa aagaaatgaa aactatccac ggaactactc gtgccctttt gaacaacatg 240  
 gttgttggtg tatcagaagg attcaagaaa gaacttgaaa tgcgtggggt tggttaccgt 300  
 gcacagcttc aaggatctaa acttgttttg gctgttggtg aatctcatcc agacgaagtt 360  
 gaagctccag aaggaattac ttttgaactt ccaaaccxaa caacaatcgt tgtagcgga 420  
 atttcaaaag aagtagttgg tcaaacagct gcttacgtac gtagccttcg ttcaccagaa 480  
 ccatataaag gttaaaggat ccgttacgtt ggtgaattcg ttcgccgtaa agaaggtaaa 540  
 acaggtaa at aa 552

<210> 447  
 <211> 426  
 <212> DNA  
 <213> Streptococcus pneumoniae

<400> 447  
 tcatcaacca ccaacctatt ttccaacttt gtgcatagca cacgatttaa aactaaagag 60  
 gtgaaaactg tgatttcaaa accagataaa aacaaactcc gccaaaaacg ccaccgtcgc 120  
 gttcgcggaa aactctctgg aactgctgat cgcccacgtt tgaacgtatt ccgttcta at 180  
 acaggcatct acgctcaagt gattgatgac gtagcgggtg taacgctcgc aagtgttca 240  
 actcttgata aagaagtttc aaaaggaact aaaactgaac aagccgttgc tgtcggtaaa 300

ctcgttgacag aacgtgcaaa cgctaaaggt atttcagaag tgggtgttcga ccgcggtgga 360  
 tatctatatc acggacgtgt gaaagctttg gctgatgcag ctcgtgaaaa cggattgaaa 420  
 ttctaa 426

<210> 448  
 <211> 498  
 <212> DNA  
 <213> Streptococcus pneumoniae

<400> 448  
 aaaatggcat ttaaagacaa tgcagttgaa ttagaagaac gcgtagttgc tgtcaaccgt 60  
 gttacaaaag ttgttaaagg tggacgtcgt cttcgtttcg cagctcttgt tgttgttggt 120  
 gaccacaatg gtcgcgtagg atttggtact ggtaaagctc aagaagttcc agaagcaatc 180  
 cgtaaagcag tagatgatgc taagaaaaac ttgatcgaag ttcctatggt tggacaaca 240  
 atcccacacg aagttctttc agaattcggg ggagctaaag tattgttgaa acctgctgta 300  
 gaaggttctg gagttgccgc tgggtggtgca gttcgtgccg ttgtggaatt ggcaggtgtg 360  
 gcagatatta catctaaatc acttggttct aacactccaa tcaacattgt tcgtgcaact 420  
 gttgaagggt tgaacaatt gaaacgcgct gaagaaattg ctgcccttcg tggattttca 480  
 gtttctgatt tggcataa 498

<210> 449  
 <211> 468  
 <212> DNA  
 <213> Streptococcus pneumoniae

<400> 449  
 cattttacaa aagaggagaa aataaaaatg aaacttcatg aattgaaacc tgcagaaggt 60  
 tctcgtaaag tacgtaaccg cgttggtcgt ggtacttcat caggtaacgg taaaacatct 120  
 ggtcgtggtc aaaaagggtca aaaagctcgt agcggtggtg gagttcgcct tggttttgaa 180  
 ggtggacaaa ctccattgtt ccgtcgtctt ccaaaaactg gattcactaa catcaacgct 240  
 aaagaatacg caattgtgaa ccttgaccaa ttgaacgtct ttgaagatgg tgctgaagta 300  
 actccagttg ttcttatcga agcaggaatt gttaaagctg aaaagtcagg tattaaaatt 360  
 cttggtaacg gtgagttgac taagaaattg actgtgaaag cagctaaatt ctctaaatca 420  
 gctgaagaag ctatcactgc taaagggtgg tcaagtagaag tcatctaa 468



<210> 450  
 <211> 1314  
 <212> DNA  
 <213> *Streptococcus pneumoniae*

<400> 450  
 cctatgtttt ttaaattatt aagagaagct cttaaagtca agcaggttcg atcaaaaatt 60  
 ttattttacaa tttttatcgt tttggtcttt cgtatcggaa ctagcattac agttcctggg 120  
 gtgaatgcc aatagcttgaa tgctttaagt ggattatcct tcttaaacaat gttgagcttg 180  
 gtgtcgggga atgccctaaa aaacttttcg atttttgccc taggagttag tccctatatc 240  
 accgcttcta ttgttgcca actcttgcaa atggatattt taccacaagt tgtagagtgg 300  
 ggtaacaag gggaagtagg tcgaagaaaa ttgaatcaag ctactcgta tattgtctta 360  
 gttctcgctt ttgtgcaatc tatcgggatt acagctgggt ttaatacctt ggctggagct 420  
 caattgatta aaactgcttt aactccacaa gtttttctga cgattgggtat catcttaaca 480  
 gctggtagta tgattgtcac ttggttgggt gagcaaatta cagataaggg atacggaaac 540  
 ggtgtttcca tgattatctt tgccgggatt gtttcctcaa ttccagagat gattcagggc 600  
 atctatgtgg actactttgt gaacgtccca agtagccgta tcacttcac tatcattttc 660  
 gtaatcattt tgattattac tgtattgttg attatttact ttacaactta tgttcaacaa 720  
 gcagaatata aaattccaat ccaatatact aagggtgcac aagggtgctc atctagctct 780  
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 <211> 651  
 <212> DNA  
 <213> *Streptococcus pneumoniae*

<400> 451  
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 gaattgggtc ctgacgaagt taaaaatgga atcgtaaaag aacgcctttc acaagatgat 240  
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 ttggacaaaa cattggctga acttggcatt gaactagaag gtgttatcaa tattgaagtg 360  
 aaccctgaca gccttttgga acgtttgagt gggcgtatca tccaccgct aactggagaa 420  
 actttccaca aggtctttta cccaccagtt gactataaag aagaagatta ctaccaacgt 480  
 gaagatgata agcctgagac agtaaaacgt cgtttggatg ttaatatgtc tcaaggagaa 540  
 ccaatcattg ctactaccg tgccaaaggt ttggttcatt acatcgaagg taatcaagat 600  
 atcaatgatg tcttctcaga tattgaaaaa gtattgacaa atttgaata a 651

<210> 452  
 <211> 378  
 <212> DNA  
 <213> Streptococcus pneumoniae

<400> 452  
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 gctggaatct cagaagatgt tcgtgtacgt gatcttacat cagatcaaga agatgctatc 180  
 cgctgtgaag tggatgcaat caaagttgaa ggtgaccttc gtcgtgaagt aaacttgaac 240  
 atcaaacgtt tgatggaaat cggttcatat cggtgtatcc gtcaccgtcg tggacttcct 300  
 gtccgtggac aaaacactaa aaacaacgcc cgcactcgta aaggtaaagc tgttgcgatt 360  
 gctggtaaga aaaaataa 378

<210> 453  
 <211> 396  
 <212> DNA  
 <213> Streptococcus pneumoniae

<400> 453  
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ggtaaatgcaa ttgcttggtc atcagctggg gctcttggtt tcaaagggtc tcgtaaattct 180  
 acaccattcg ctgctcaaat ggcttctgaa gctgctgcta aatctgcaca agaacacggg 240  
 cttaaatcag ttgaagttac tgtaaaagggt ccagggttctg gtcgtgagtc agctattcgt 300  
 gcgcttgctg ccgctgggtc tgaagtaaca gcaattcgtg atgtgactcc agtgccacac 360  
 aatgggtgctc gtcctccaaa acgtcgccgt gtataa 396

<210> 454

<211> 402

<212> DNA

<213> Streptococcus pneumoniae

<400> 454

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 cgtgctaaag aaatccgtaa aactgttgaa aaaatgatta ctctaggtaa acgtggtgat 180  
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 gcacctcggt atgctgaacg taacgggtgga tacactcgta tccttaaaac tgaatcacgt 360  
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<210> 455

<211> 414

<212> DNA

<213> Streptococcus pneumoniae

<400> 455

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 gcccttcgta aattcgctcg tgtacgtttg agcaacctta tcgaagttac tgcctacatc 240  
 ccagggtatcg gacacaactt gcaagagcac agcgtggtgc ttcttcgctg tggacgtgta 300  
 aaagaccttc caggggtacg ttaccatata gtccgtggtg cacttgatac tgcaggtggt 360  
 aacgatcgta aacaaggccg ttctaaatac ggtactaaac gtccaaaagc ataa 414

<210> 456

&lt;211&gt; 477

&lt;212&gt; DNA

&lt;213&gt; Streptococcus pneumoniae

&lt;400&gt; 456

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gctgcttcaa tcgtttacgg tgcttttgag caaatcaaag aagctactgg caacgatgca      180
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cgtgttggtg gttctaacta ccaagtccca gttaaagtgc gtccagaacg tcgtacaaca      300
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cgtcttgcaa aagaaatctt ggatgctgct aacaacactg gtgcagcagt taagaaacgt      420
gaagatactc accgtatggc tgaagctaac cgtgcattcg cacacttccg ttggtaa          477

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&lt;210&gt; 457

&lt;211&gt; 930

&lt;212&gt; DNA

&lt;213&gt; Streptococcus pneumoniae

&lt;400&gt; 457

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ggctgggctt atacactcat tccagctatc aaaaaactct atactaaaaa agaagatcaa      180
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ggcaatatct tggggccact cctcttcttt gttgcatgga acttgattcg tatgtcattc      480
tttggttatg ttcaagagat tggatacaag gctggatcag aaatcactaa agatatgtct      540
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gcattcgcac aagtaggaca aggattgtct caaactcctg aaaaagttac tactttccaa      780
caaaacttgg atatgttgat tcctggatta tcaggactac tccttacttt actttgcatg      840

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<210> 458

<211> 831

<212> DNA

<213> Streptococcus pneumoniae

<400> 458

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gtagcctgta cccttattgg gcttgtaaca ggtcactthg aagcagggat taccctcggt 180  
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gctctthgtht tcgttctcgc tgetgtgtca gatattactc taatcgtht cggtgctatc 720  
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<210> 459

<211> 1014

<212> DNA

<213> Streptococcus pneumoniae

<400> 459

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gthgtgacct ttatgcaaaa tgaagthcct gatgatctat acgctaagth taataacgct 180  
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attaaacaag cagctccagg taatgtcaag gctaacgtgg ttccaattca aaaactgatt 720  
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<210> 460

<211> 1128

<212> DNA

<213> Streptococcus pneumoniae

<400> 460

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gtagtcccag ttgttcaaaa acgtccagta gaagatgctg ttgccatttt cgacgaaatg 1080  
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<210> 461

<211> 477

<212> DNA

<213> Streptococcus pneumoniae

<400> 461

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cttccacaca atacacttgg acgcgctcaa ggtatgaagt tgaaagtatt tgttggagct 420  
gagcacactc acgctgcaca acaaccagaa gttcttgaca tttcaggact tatctaa 477

<210> 462

<211> 396

<212> DNA

<213> Streptococcus pneumoniae

<400> 462

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cgcgaggac ttcttacacg tgactcacgt aaagttgaac gtaagaaacc aggtcttaag 360  
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<210> 463  
 <211> 834  
 <212> DNA  
 <213> Streptococcus pneumoniae

<400> 463  
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 ttacacttt tagtttacta ctgatcaaa gaaaagaaat ggacaacata taaactcggt 780  
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<210> 464  
 <211> 1533  
 <212> DNA  
 <213> Streptococcus pneumoniae

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<210> 465

<211> 2166

<212> DNA

<213> Streptococcus pneumoniae

<400> 465

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&lt;210&gt; 468

&lt;211&gt; 1500

&lt;212&gt; DNA

&lt;213&gt; Streptococcus pneumoniae

&lt;400&gt; 468

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<210> 469

<211> 438

<212> DNA

<213> *Streptococcus pneumoniae*

<400> 469

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 <212> DNA  
 <213> Streptococcus pneumoniae

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<211> 1620  
<212> DNA

<213> Streptococcus pneumoniae

<400> 472

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<211> 1140

<212> DNA

<213> Streptococcus pneumoniae

<400> 473

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<211> 297

<212> DNA

<213> Streptococcus pneumoniae

<400> 474

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<210> 475

<211> 1158

<212> DNA

<213> Streptococcus pneumoniae

<400> 475

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 <212> DNA  
 <213> Streptococcus pneumoniae

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 gaagctgacg atgtggaaat ccgtcttcac agcattatct acaagggttat cgaagagatg 2580  
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 gatggtgaac tcgcaagctt gaaacactat aaagacgacg tgaaagaagt gacaaacggc 2820  
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 gcgtatgtca tggaagaaat caagagataa 2910

<210> 477  
 <211> 912  
 <212> DNA

<213> Streptococcus pneumoniae

<400> 477

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cccataaaaa tatacaggag gcctgataaa atggcaatcg tttcagcaga aaaatttgtc      60
caagcagccc gtgacaacgg ttatgcagtt ggtggattta acacaaacaa ccttgagtgg      120
actcaagcta tcttgcgcgc agcagaagct aaaaaagctc cagttttgat ccaaacttca      180
atgggtgctg ctaaatacat ggggtggttac aaagttgctc gcaacttgat cgctaacctt      240
gttgaatcaa tgggtatcac tgtaccagta gctatccacc ttgaccacgg tcactacgaa      300
gatgcacttg agtgtatcga agttggttat acttcaatca tgtttgacgg ttcacacctt      360
ccagttgaag aaaaccttaa attggctaaa gaagttgttg aaaaagcaca cgctaaaggt      420
atctcagtag aagctgaagt tggctactatc ggtggtgaag aagatggaat catcggtaaa      480
ggtgaattgg ctccaatcga agacgctaaa gcaatgggtg aaactggtat cgacttcttg      540
gcagctggta tcggtaacat ccacggtcct taccagtaa actgggaagg tcttgacctt      600
gaccacttgc aaaaattgac agaagctctt ccaggattcc caatcgtatt gcacggtgga      660
tcaggtattc ctgatgagca aatccaagca gctatcaaac ttggtgttgc caaagttaac      720
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gaagcaaacy aagcagaata cgacaagaaa aaactcttcg acccacgtaa attcttggct      840
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<210> 478

<211> 468

<212> DNA

<213> Streptococcus pneumoniae

<400> 478

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aaatctctaa ttaccgcaa aaccacaaag gaggatttaa aaatggctaa aaaagtcgaa      60
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gctcttggtc aagctggtat caacatcatg ggattcacia aagagttcaa cgctcgtaca      180
gctgaccaag ctggtatgat cattccagtt gttatctcag ttacgaaga taaatcatTT      240
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aaaggatcag gtacacctaa taaaactaaa gttgctacag ttactcgtgc acaagtacaa      360
gaaattgcag aaactaagat gccagatttg aacgcagcaa acgtagagtc tgcaatgcgt      420

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atgatcgaag gtactgctcg ttctatggga ttcactgttg ttgactaa 468

<210> 479

<211> 693

<212> DNA

<213> Streptococcus pneumoniae

<400> 479

aaaatggcta aaaaaagcaa acaacttcgt gctgctcttg agaaaatcga cagcacaaaa 60  
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gcaactgtag aagttgctta caacttgaac atcgacgtta aaaaagctga ccaacaaatc 180  
cgtggagcaa tggatttggc aaacggtact ggtaaaactt cacgtgttct tgttttcgca 240  
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aaaccagcta cagctaaagg aacttacgta acaaaactga ctatcacaac tactcaaggt 660  
gttggtatca aagttgacgt aaactcactt taa 693

<210> 480

<211> 1866

<212> DNA

<213> Streptococcus pneumoniae

<400> 480

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gaaacgcttg atgcacggac tgaattggca gagcgtgcta tggactcaa cgaatcga 180  
aaagagcgtg gaattaccat cttgctaaa aatactgccg ttgcttaca cggaaactcg 240  
atcaacatta tggacacacc aggacacgcg gactttggtg gagaagttga gcgtatcatg 300  
aaaatgggtg acggtggttg cttggctgta gatgcctatg aaggaaccat gccacaaact 360  
cgtttcgtat tgaaaaaagc cttggaacaa gaccttgctc caatcgtggt tgttaacaaa 420

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tctcttgagt tcttgaacga cgatgagtac atggaagtaa cgcctgagtc tatccgtttg 1800
cgtaaacaaa tccttaacaa agcagagcgt gagaaagcta acaagaagaa aaaatcagct 1860
gaataa 1866

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<210> 481

<211> 1200

<212> DNA

<213> *Streptococcus pneumoniae*

<400> 481  
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 ttggagccaa tggcgcaaca agttattcct aaagcagcat ttggctatat cgctagtggg 180  
 gcggaagata ctttcacttt aagagagaat atccgtgcct ttaaccacaa gctcatcggt 240  
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 gaagtggcga ctgcgcgtgg tgtgcatgag tttggttctc tttatacaac cagttcttac 420  
 tctactgttg accttccaga gatttctgaa gccctccaag ggacacctca ttggtttcaa 480  
 ttttacttta gtaaggatga cggatatcaac gccacatca tggaccgtgt gaaggctgaa 540  
 ggttataaag cgattgtctt gacggcagat gctactgtag gggggaatcg tgaagtggat 600  
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 ggtggtcgtc aaatcgacgg tggaccagct gcctttgact cgcttcaaga agtggcagaa 900  
 gcagttgata gacgtgtgcc gattgtcttt gactctgggt ttcgtcgtgg tcaacacgtc 960  
 tttaaagcct tggcatcagg agcagacttg gttgctattg gacgccctgt catctatggc 1020  
 ttggctctcg gtggtagtgt cgggtgtcgt caagtctttg aacacttgaa tgcggaattg 1080  
 aagacagtta tgcaattgtc tggaaactcag accattgaag atgtcaaaca cttcaagctc 1140  
 cgtcacaatc catacaacc aaccttccca gttgaccctc gtgacttaaa attgtattga 1200

<210> 482  
 <211> 1011  
 <212> DNA  
 <213> *Streptococcus pneumoniae*

<400> 482  
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 gccaagctac gtgatgagtt tggctacgac atcccaagtg aaaaaatcgg agaattattg 180



gccatctcag cccatccaaa tggagtctct aaagttgcc aatggtcgtta cgagggaaca 240  
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 tttccacttt tgaccaagat cctcgatgcc aacgactggc tcagtgtcca agttcaccca 360  
 gacgatgctt atggactcga gcatgaaggc gaactcggaa aaacagaatg ctggtacatt 420  
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 ctccgccagc aaatcgagga caagaactgg gatgacttgt tgaccaaaagt ccctgttaag 540  
 gctggagatt tcttctatgt accaagcggg actatgcacg ctatcggggc gggatatctta 600  
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 gatgacaaag gcaacttgcg tgaacttcat cttgaaaaat ccatcgatgt cttgaacatt 720  
 ggtgagccag caaatagccg tcctgtaact gttaaagcag atgatttgcg ttccactctc 780  
 cttgtatcta atgatttctt cgcagtttac aagtgggaaa ttactggaaa agttgacttt 840  
 gaaaagacag ctgactacag cttattgagt gtcttggctg gtcaaggcca gctaactgtt 900  
 gacgggaaaa attatccaat tcaaaaaggc agccacttta tcctaccaag tgatgttgaa 960  
 gcttggactc tggaagggca aggtttggaa ttgattgtta gccatccata a 1011

<210> 483

<211> 864

<212> DNA

<213> Streptococcus pneumoniae

<400> 483

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 gctgatcagg tctttgttga tgacgccagt ctcgatattg accaaatgat ggaaaccatg 180  
 tatgcaactg cagaagcttc aaaatcggct tgtccaagcc cagatgacta tttgcgagca 240  
 tttgaagggtg ccaaaaacat tttcctagta accatcacag gtaccctttc tggcagtcac 300  
 aatagtgtc aactagcaaa gaatatttat ctggaagacc atcctgacac taagattcat 360  
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 ttgattgacc agggcttgtc ttttgaagaa gtgggtgaag ctatcaccgc ctatcaagaa 480  
 aaaactaagt tgctctttgt ctagccaaa gtcgataact tgggtgaagaa cggccgtttg 540  
 agcaagctta tcggtacggc cgttggcctt ctcaacattc gtatggtcgg aaaagctagt 600

gaaactggga ctctcgaatt gctacaaaaa gcaaggggat caaagaaatc agttcaagct 660  
 gcctatgatg agttagtaaa agctggatat gctggtggcc gtattgtcat ggcccaacgc 720  
 aataacgaaa aatgttgtca acagctctca gagcgaatcc gtgaaacctt cccacaagcg 780  
 gatattaaaa ttctaccaac ctctggtctc tgcagtttct atgcagaaga gggcggtttg 840  
 ctgatgggct atgaaattga ttaa 864

<210> 484  
 <211> 681  
 <212> DNA  
 <213> Streptococcus pneumoniae

<400> 484  
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 attgaagtta ttaatcacc cactgattcaa cacaatttgt caatcttgcg tcgtacagat 120  
 acttctacaa aagcttttcg tgagctagta gatgagattg caatgttgat ggggtatgaa 180  
 gtacttcgtg atcttcact agaagatgtg gaaatcgaaa caccaattac aaaaacagtt 240  
 caaaaacaat tggcaggtaa gaaattggcc atcgtcccaa tcttgcgctgc aggtatcggg 300  
 atggttgatg gtctcttgaa cttggttcca gctgctaaag ttggccacat cgggtatgtac 360  
 cgtgatgaag aaacacttca accagttgaa tacttggtga aattgcctga ggacattgac 420  
 caacgtcaaa tttttgtagt agaccaatg ttggcaacag gtggctcagc aatcttggtc 480  
 gttgattctc ttaaaaaacg tggcgcacat aatatcaaat ttgtctgcct tgtatctgct 540  
 ccagaggggtg taaaagccct tcaagaagct catccagatg tagaaatctt tacagcagcc 600  
 ttggatgaac gtttgaacga acacggttat atcgttccag gtcttgagga tgctggagac 660  
 cgcttggttc gtacaaaata a 681

<210> 485  
 <211> 951  
 <212> DNA  
 <213> Streptococcus pneumoniae

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 gcagtcgtag gacctgcgac atctggtgcy actgcagctg cggtagcgaa cgctacaaaa 180  
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tacctcttta ttggaacttt ccaagatagc ttccaaggaa aaattatctc aaactatgtt 300  
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 gtagaagttt cagctaaagc taaagccttc cttgacgctt accgtgctaa gtacaatgaa 720  
 gagccttcaa catttgcagc cttggccttat gattcagttc accttgtagc aaacgcagca 780  
 aaaggtgcta aaaattcagg tgaaatcaag aataaccttg ctaaaacaaa agattttgaa 840  
 ggtgtaactg gtcaacaag cttcgatgca gaccacaaca cagtcaaaac tgcttacatg 900  
 atgaccatga acaatggtaa agttgaagca gcagaagttg taaaaccata a 951

<210> 486

<211> 1218

<212> DNA

<213> *Streptococcus pneumoniae*

<400> 486

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 attttagcaa aggatccaga ggcgcacgtt gctgctgaaa cagctgtata tactggttct 180  
 gtccacgttt ttggtgaaat ttctacaaat gcctatgtgg atattaaccg tgtggttcgt 240  
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 ggagtacacc catcttttggg ggaacaatct cctgacatcg ctcaagggtg taacgaagcc 360  
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 ctccgtccag atgcaaaatc acaagttaca gttgagtacg atgaaaatga ccgtccggtg 600  
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aaagaagcag taaaataa 1218

<210> 487  
<211> 291  
<212> DNA  
<213> Streptococcus pneumoniae

<400> 487  
agaaatgaga ctttaaaaat ggcagttaaa atccgtttga ctctgatggg ttctaagaaa 60  
aaacctttct accgtatcaa cgtacagat tcacgttcac cagtgacgg acgtttcatc 120  
gaaacagttg gaacttacia ccacttggt gctgaaaacc aagtaacttt gaaagaagac 180  
cgcgttcttg catggttggc taatggagct caaccttcag acacagtacg taacatcctt 240  
tcaaaagaag gcgtattgaa aaaattccac gattctaaat tttcaaaata a 291

<210> 488  
<211> 414  
<212> DNA  
<213> Streptococcus pneumoniae

<400> 488  
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gataagattt accaagccat cttgaaggca gcccaactg tttatgtttt gacagatgat 180  
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gtggaacgtg cgactatcag tatgattcaa tctatgggtg aacatcgttt attgggcgca 300  
ggttacatta ccattgcaga acactacatt tcctatcggt tacaacgtga cttggaaaga 360

agtgggttatg gagatcatat cgcagttcat ttacattttg aacaaattcg ctaa 414

<210> 489

<211> 2268

<212> DNA

<213> Streptococcus pneumoniae

<400> 489

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acagatccta acaatagcct cttcaaaggt atgacggatc tgaacaatcg tgacttcgat 180  
ccctttggtg atttcttcaa tgatctaaac aatttcagac cttctagcaa tactcctcct 240  
attcccccaa cccaatcagg tggaggttac ggtggaaacg gcggttatgg ttcccaaaat 300  
cgtggatctg ctcaaactcc gccacctagc caagaaaaag gcctgctgga agaatttggt 360  
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gagattatcc gtgtcatcga gattctcaat cgtagaacca agaataatcc tgtccttate 480  
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<210> 490

<211> 1203

<212> DNA

<213> Streptococcus pneumoniae

<400> 490

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<210> 491

<211> 1443

<212> DNA

<213> Streptococcus pneumoniae

<400> 491

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taa	1443

&lt;210&gt; 492

&lt;211&gt; 1254

&lt;212&gt; DNA

&lt;213&gt; Streptococcus pneumoniae

&lt;400&gt; 492

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<210> 493

<211> 1074

<212> DNA

<213> Streptococcus pneumoniae

<400> 493

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<210> 496

<211> 861

<212> DNA

<213> Streptococcus pneumoniae

<400> 496

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<210> 497

<211> 885

<212> DNA

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 ggtactgcag aagaaggggc attgttttagc cttactgcag aaggtaagat tgtggttaac 1020  
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<210> 494

<211> 1545

<212> DNA

<213> Streptococcus pneumoniae

<400> 494

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<210> 495

<211> 1488

<212> DNA

<213> Streptococcus pneumoniae

<400> 495

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<213> *Streptococcus pneumoniae*

<400> 497

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attattctct tgcccgagtt gtttgaacat ccctatttct gtcaggaacg tcagtatgac      180
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<210> 498

<211> 363

<212> DNA

<213> *Streptococcus pneumoniae*

<400> 498

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&lt;210&gt; 499

&lt;211&gt; 555

&lt;212&gt; DNA

<213> *Streptococcus pneumoniae*

&lt;400&gt; 499

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&lt;210&gt; 500

&lt;211&gt; 585

&lt;212&gt; DNA

<213> *Streptococcus pneumoniae*

&lt;400&gt; 500

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attcctacag aatatttaat tgatagccaa ggaaagattg gaaagattca atttggtgct      540
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&lt;210&gt; 501

&lt;211&gt; 1269

&lt;212&gt; DNA

<213> *Streptococcus pneumoniae*

&lt;400&gt; 501

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&lt;210&gt; 502

&lt;211&gt; 1035

&lt;212&gt; DNA

<213> *Streptococcus pneumoniae*

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 <211> 2700  
 <212> DNA  
 <213> Streptococcus pneumoniae

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 <211> 372  
 <212> DNA  
 <213> Streptococcus pneumoniae

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 tcggaaagat ag 372

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 <211> 1050  
 <212> DNA  
 <213> Streptococcus pneumoniae

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gcactcaact ctaaccaaga gattgcacaa aaaattgccc aagctgttgg tgtcccactt 180  
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<211> 1470  
<212> DNA  
<213> Streptococcus pneumoniae

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caagctgcgc gtgcagccct gccagcatgg cgagctttat cagcagttga acgtgcggct 240  
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<210> 507

<211> 993

<212> DNA

<213> Streptococcus pneumoniae

<400> 507

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<210> 508

<211> 546

<212> DNA

<213> Streptococcus pneumoniae

<400> 508

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<210> 509

<211> 441

<212> DNA

<213> Streptococcus pneumoniae

<400> 509

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<210> 510

<211> 1893

<212> DNA

<213> Streptococcus pneumoniae

<400> 510

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&lt;210&gt; 511

&lt;211&gt; 1347

&lt;212&gt; DNA

&lt;213&gt; Streptococcus pneumoniae

&lt;400&gt; 511

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<210> 512

<211> 750

<212> DNA

<213> Streptococcus pneumoniae

<400> 512

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 aatattttca tagtctggaa taccaataag tatcaagtta gccaggatc aaaagaaaaa 180  
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 aatgctaaaa atggcatgaa gatttatcta accgataaaa ataaagttaa tacttatgaa 540



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 gtcaatgaaa tcacattagt aacctgtgaa gaccttgctg ctacagaacg tattattgtc 660  
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 <213> Streptococcus pneumoniae

<400> 513  
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 aactaa 1026

<210> 514  
 <211> 588  
 <212> DNA

<213> Streptococcus pneumoniae

<400> 514

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catcaagtca ctgtcttaat gactcaggct gctacagagt ttatccaacc tttgacacta      180
caggctactct cacagaatcc tgtccacttg gatgtcatga aggaacccta tcctgatcag      240
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cctaaggaat ccctactagc ttgtggagac cacggacgag gagctttagc tgacctcaca      540
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<210> 515

<211> 924

<212> DNA

<213> Streptococcus pneumoniae

<400> 515

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gaacaactgg gtggaatgac caatcaaaac tattttggcca aaacaacaaa taagcaatac      180
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tatggagggt cagatgaaaa gtaa 924

<210> 516  
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<212> DNA  
<213> Streptococcus pneumoniae

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acaatcgatt taccctttga gaatttaagc cttcctgcac ctgaaaaatt tgatactatt 720  
ttgacacaat tttatggaga ttatatgacc ctaccaccag aagaaaaacg cttctacagt 780  
catgaatttc acgcttataa attggaggat tag 813

<210> 517  
<211> 357  
<212> DNA  
<213> Streptococcus pneumoniae

<400> 517  
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gaacgtatcc agat tttttga aggtgttgtt atcgcacgta aaggtgctgg aatctcagaa 180

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<210> 518  
 <211> 459  
 <212> DNA  
 <213> Streptococcus pneumoniae

<400> 518  
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 gatgaatgta caactgttga cgcttcagac ttcttgggaag cagacatcgc tatcgttgcg 180  
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 gatgaattct gtaaggctgt tgatgacttt gaccgtgtct ttgtgtcaac aggagcagaa 360  
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<210> 519  
 <211> 438  
 <212> DNA  
 <213> Streptococcus pneumoniae

<400> 519  
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<210> 520  
 <211> 627

&lt;212&gt; DNA

&lt;213&gt; Streptococcus pneumoniae

&lt;400&gt; 520

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acactaatga gtgaagcaat tattgctaaa aaagcggaac tagttgacgt agtagctgaa      180
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gatacagttc ttcgtcgtga gcttcgtgga agcgaagttg agtataaagt tattaataaac      300
tcaatcttgc gtcgtgcagc tgaaaaagct ggtcttgaag atcttgcac tgtatttgtt      360
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gacttttcta aaaacgctga agcacttgaa attaaaggtg gtgcaatcga aggcgctgtc      480
gcatctaaag aagagattct tgcacttgca actcttccaa accgcgaagg acttctttct      540
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gcagaaagca aagaagacgc ggcttaa                                     627

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&lt;210&gt; 521

&lt;211&gt; 1809

&lt;212&gt; DNA

&lt;213&gt; Streptococcus pneumoniae

&lt;400&gt; 521

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aatccagcca agtctattgt gaaatcaatg catcccaaca tggaaaggag gactagaatg      60
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&lt;210&gt; 522

&lt;211&gt; 1053

&lt;212&gt; DNA

&lt;213&gt; Streptococcus pneumoniae

&lt;400&gt; 522

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<210> 523

<211> 1329

<212> DNA

<213> *Streptococcus pneumoniae*

<400> 523

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ttaagataa                                     1329

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&lt;210&gt; 524

&lt;211&gt; 825

&lt;212&gt; DNA

&lt;213&gt; Streptococcus pneumoniae

&lt;400&gt; 524

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<210> 525

<211> 1395

<212> DNA

<213> *Streptococcus pneumoniae*

<400> 525

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<210> 526

<211> 1263

<212> DNA

<213> Streptococcus pneumoniae

<400> 526

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<210> 527

<211> 873

<212> DNA

<213> Streptococcus pneumoniae

<400> 527

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<210> 528

<211> 1416

<212> DNA

<213> Streptococcus pneumoniae

<400> 528

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&lt;210&gt; 529

&lt;211&gt; 888

&lt;212&gt; DNA

&lt;213&gt; Streptococcus pneumoniae

&lt;400&gt; 529

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<210> 530

<211> 1536

<212> DNA

<213> *Streptococcus pneumoniae*

<400> 530

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&lt;210&gt; 531

&lt;211&gt; 567

&lt;212&gt; DNA

&lt;213&gt; Streptococcus pneumoniae

&lt;400&gt; 531

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&lt;210&gt; 532

&lt;211&gt; 498

&lt;212&gt; DNA

&lt;213&gt; Streptococcus pneumoniae

&lt;400&gt; 532

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cagctaggag aagcttaa                                     498

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&lt;210&gt; 533

&lt;211&gt; 1419

&lt;212&gt; DNA

&lt;213&gt; Streptococcus pneumoniae

&lt;400&gt; 533

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 <212> DNA  
 <213> Streptococcus pneumoniae

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 aacgaagatt aa 252

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 <213> Streptococcus pneumoniae

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<210> 536

<211> 1638

<212> DNA

<213> Streptococcus pneumoniae

<400> 536

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<210> 537

<211> 2751

<212> DNA

<213> Streptococcus pneumoniae

<400> 537

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 <213> Streptococcus pneumoniae

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<211> 1164

<212> DNA

<213> Streptococcus pneumoniae

<400> 540

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 <213> Streptococcus pneumoniae

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<210> 542

<211> 1317

<212> DNA

<213> *Streptococcus pneumoniae*

<400> 542

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<210> 543

<211> 2370

<212> DNA

<213> Streptococcus pneumoniae

<400> 543

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 <213> Streptococcus pneumoniae

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&lt;211&gt; 708

&lt;212&gt; DNA

&lt;213&gt; Streptococcus pneumoniae

&lt;400&gt; 546

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<210> 547

<211> 549

<212> DNA

<213> Streptococcus pneumoniae

<400> 547

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<211> 1389

<212> DNA

<213> Streptococcus pneumoniae

<400> 548

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<211> 2073

<212> DNA

<213> Streptococcus pneumoniae

<400> 549

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 cacacagcag aacaaatcaa ggccatcatt gctgaattga gctaa 345

<210> 552

<211> 624

<212> DNA

<213> Streptococcus pneumoniae

<400> 552

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 ttctcaaadc ttaaagaaaa aatcggtaac agcgatgacg taacaagtgg tgttaacgta 240  
 gaagttggta aaacacaagt tgcagttgac ttaaacgtta ttgttgagta ccaaaaaaat 300  
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<210> 553

<211> 1764

<212> DNA

<213> Streptococcus pneumoniae

<400> 553

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&lt;210&gt; 554

&lt;211&gt; 480

&lt;212&gt; DNA

&lt;213&gt; Streptococcus pneumoniae

&lt;400&gt; 554

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&lt;210&gt; 555

&lt;211&gt; 1014

&lt;212&gt; DNA

&lt;213&gt; Streptococcus pneumoniae

&lt;400&gt; 555

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 <212> DNA  
 <213> Streptococcus pneumoniae

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<210> 559

<211> 1176

<212> DNA

<213> Streptococcus pneumoniae

<400> 559

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<211> 3720

<212> DNA

<213> *Streptococcus pneumoniae*

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<210> 561

<211> 1011

<212> DNA

<213> Streptococcus pneumoniae

<400> 561

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<212> DNA  
<213> Streptococcus pneumoniae

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<210> 563  
<211> 1224  
<212> DNA  
<213> Streptococcus pneumoniae

<400> 563  
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&lt;210&gt; 564

&lt;211&gt; 528

&lt;212&gt; DNA

&lt;213&gt; Streptococcus pneumoniae

&lt;400&gt; 564

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<210> 565

<211> 1113

<212> DNA

<213> Streptococcus pneumoniae

<400> 565

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 <211> 591  
 <212> DNA  
 <213> *Streptococcus pneumoniae*

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 <211> 2205  
 <212> DNA  
 <213> *Streptococcus pneumoniae*

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 <211> 1221  
 <212> DNA  
 <213> Streptococcus pneumoniae

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<210> 569  
 <211> 1098  
 <212> DNA  
 <213> Streptococcus pneumoniae

<400> 569

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<210> 570

<211> 1704

<212> DNA

<213> Streptococcus pneumoniae

<400> 570

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<210> 571
<211> 1050
<212> DNA
<213> Streptococcus pneumoniae
<400> 571

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cgtatttggg gaaatcttcc cgagcaaatc aatgaaatta atacacacca tactaataag      180
cactacttta aagatgtcgt tctagacgaa aatatcattg cctacaccga cttagcagaa      240
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&lt;210&gt; 572

&lt;211&gt; 1284

&lt;212&gt; DNA

<213> *Streptococcus pneumoniae*

&lt;400&gt; 572

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ggttcatctg aagtcaaaga actcactgta tatgtagacg agggatataa gagctatatt      180
gaagagggtg ctaaagctta tgaaaaagaa gctggagtaa aagtcactct taaaactggg      240
gatgctctag gaggtcttga taaactttct cttgacaacc aatctggtaa tgtccctgat      300
gttatgatgg ctccatacga ccgtgtaggt agccttggtt ctgacggaca actttcagaa      360

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 gacttggtga aagatgctcc aaaaacattt gctgacttgg aaaaccttgc taaagatagc 540  
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<210> 573  
 <211> 1023  
 <212> DNA  
 <213> Streptococcus pneumoniae

<400> 573  
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 catgctgggt taaaagttgt caaacctcaa gaagctctgg ttctgacact ctttggtaac 240  
 tatacaggta ccatcaaaga acctggcttt tactttgtca atcccttcag cgtagcagtc 300  
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 tatgctccag aaattgctgc cgttatgctt caacgccaac aagcatctgc cattattgat 840  
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 aatgaagggg aattggtaga acttgacgaa gaacgaaaag ctgccatggg ttcaaattctc 960  
 cttgtcgttc tttgtggcaa tcatgatgca caaccaattg tcaacacagg aagcctttac 1020  
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<210> 574

<211> 1041

<212> DNA

<213> *Streptococcus pneumoniae*

<400> 574

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 ggtgctcacc cagaatacct cggagcaaat gatattcagt tgggtaaaaa agaattctact 300  
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 caacgtatgg ttgaagaatt ggcagaattc tcaggcgttc cagtatggaa cggctctaact 420  
 gacgaatggc acccaactca aatgctcgtt gactacttga ctgttcaaga aaacttcggt 480  
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tgcttgccag cattccacga tactcacact gtttatggta aagacgttgc tgaaaaattt 900  
 ggtgtagaag aaatggaagt aacagacgaa gtcttccgca gcaagtacgc tcgccacttc 960  
 gatcaagcag aaaaccgtat gcacactatc aaagctgtta tggctgctac acttggtaac 1020  
 ctttatattc ctaaagtata a 1041

<210> 575  
 <211> 924  
 <212> DNA  
 <213> Streptococcus pneumoniae

<400> 575  
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 gaattgtttg agaaaaaaga tgagattgcc cttgaagttc aacaccaagt agcagaagaa 480  
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<210> 576  
 <211> 558  
 <212> DNA  
 <213> Streptococcus pneumoniae

<400> 576  
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 attcgtatag gacggattga gttttctagt catcatgaaa tgctccggga gctgctttac 360  
 tcgattggtg agcgagtcag tcaagaaatt tatgaggata ttctccagct tttggttgag 420  
 caggaattga tgaccaagca ggagatgaat ttgctagaat cagtagcttt ggatcgcgtt 480  
 ttaggagaag aagctccagt tgttcgagca aacatgctac gtcagatcat acaagaggta 540  
 gatagaaaag ggaagtaa 558

<210> 577

<211> 477

<212> DNA

<213> Streptococcus pneumoniae

<400> 577

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 ggtaaaaaag gcgaaattaa ggaagtacca acagggtatg cgcaaaactt tcttatcaaa 120  
 aagaatctag ccaaagaagc gactgctcaa gctgtaggtg aacttcgtgg taaacaaaaa 180  
 tcggaagaaa aagctcacgc tgagatgatt gcagaaggaa aagcaattaa agcacaactt 240  
 gaagcagaag aaactgttgt agaatttggt gaaaaagttg gtccagatgg tcgtaccttt 300  
 ggttctatta ccaataagaa gattgcagaa gaattgcaa agcaatttgg aattaagatt 360  
 gataaacgtc atattcaagt acaagctccg attcgagcgg ttggtttgat tgatgtgcca 420  
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<210> 578

<211> 564

<212> DNA

<213> Streptococcus pneumoniae

<400> 578

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 caagagttgg atgcccgaat taacttaaaa gtttatcgtg aaaaaacggc taaagtggaa 180

gtaacgattc cgcttggatc tattactctc cgcgcagaag atgtatctca agatatgtat 240  
 ggttcaattg accttgtaac tgataaaatt gaacgtcaga ttcgtaaaaa taaaacaaaa 300  
 atcgagcgta aaaataaaaa taaggtagca actgggtcaat tatttacaga tgctttgggtg 360  
 gaagattcaa atattgtcca gtctaaagtt gttcgttcaa aacaaattga tttaaaacca 420  
 atggatttgg aagaagcaat tctacaaatg gatttattgg ggcattgattt ctttatctat 480  
 gtggatgttg aagatcagac aaccaatgtg atttatcgtc gtgaggatgg cgaaattggg 540  
 ttgtagagg ttaaagaatc ttaa 564

<210> 579

<211> 1080

<212> DNA

<213> Streptococcus pneumoniae

<400> 579

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 gtagaaacag acggtgacat cgaaaaagcg attgaattgc ttcgtgaaaa aggtatgggt 180  
 aaggcagcta agaaagctga ccgtgttgct gcagaagggt tgactgggtg ttatgttaac 240  
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 cttccacact tgaagtatgg atcaaaagct caattaactg atgatgttat tgctcaagct 780  
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gctgcaaacg acttcgaagc tgaagttgca gctacaatgg cagcagcctt gaataactaa 1080

<210> 580

<211> 873

<212> DNA

<213> Streptococcus pneumoniae

<400> 580

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 cttgaggctg gtgtacactt tggtcaccaa actcgtcgct ggaatcctaa gatggctaag 180  
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<210> 581

<211> 834

<212> DNA

<213> Streptococcus pneumoniae

<400> 581

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gaacaactgc gccaatgct tgatatgaag tctaaattgc aagccacaaa gacttttagca 360  
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ggtgaagtgg ttgccacaac gcatagtaca gactatttga cacgagaagt aactgttaaa 780  
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<210> 582

<211> 846

<212> DNA

<213> *Streptococcus pneumoniae*

<400> 582

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gttgagagcga ctgttgaaga tgatgttgct tttgggtttgg aaaatcaggg actttctcgt 360  
caagaaatga aaaagagagt ggaagaagct ctggcttttag ttggcatgtt ggactttaaa 420  
aagagagagc cagcgcgtct atcaggtggc caaaagcaac gtgtggccat tgcaggtgtt 480  
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aaaggggaaa ttgaatcaac tagtagtcca agggagcttt tctctcgaaa tgatttagat 720  
caaattggat tagacgatcc ttttgctaata caattaaaaa aatctttgag ccagaatggc 780  
tatgatttac ctgaaaatta tttgacagaa agtgagctag aggataagct atgggaattg 840  
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<210> 583  
 <211> 840  
 <212> DNA  
 <213> Streptococcus pneumoniae

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 actcaaccag aggagccttc tctttctaata tacagtgttg ttcaatcaac aagttcaact 480  
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 caattggcag tttcagatgt tacaagttgg gtcagtgttt cagaaagcga acttgagggc 660  
 ggtgtaacct tatcgccaaa gaagaaaagt gcagaagcaa cagttgcaac taaaagtcct 720  
 gtaacaatta cgtaggtgt tgtaaaagggt gttgatttga cagtagataa tcagactgtt 780  
 gatttatcga aattaacagc tcagactgga caaatcactg taacctttac taaaaattaa 840

<210> 584  
 <211> 1020  
 <212> DNA  
 <213> Streptococcus pneumoniae

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<210> 585

<211> 672

<212> DNA

<213> Streptococcus pneumoniae

<400> 585

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 ggggaacctg attttacaac gccagaccat gtcaaggagg cgggcaagcg agcgattgat 180  
 cagaaccaat cctactatac agggatgagt ggtctgctga ctctacgtca ggcagccagt 240  
 gactttgtta aggaaaagta ccaactggac tatgctcctg aaaatgaaat cttggttaca 300  
 attggggcga cagaggcttt atctgcgact ttgacggcta ttttggaaga gggagacaag 360  
 gtacttttgc cagctcctgc ttatccaggc tatgaaccga ttgttaactt agttggggca 420  
 gaaattgttg agattgatac gactgaaaat ggttttgtct tgactcctga gatgttggag 480  
 aaggccattt tggagcaggg tgataagctc aaggcggtta ttctcaacta tccagccaat 540  
 ccgacaggaa ttacctacag tcgagagcag ttagaggcct tggcagctgt tttacgcaag 600  
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<210> 586

&lt;211&gt; 1302

&lt;212&gt; DNA

&lt;213&gt; Streptococcus pneumoniae

&lt;400&gt; 586

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ttggaaattg agcaggagac gcgccacgat gtggtggctt tcacgcgtgc ggtttctgag     240
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ttcactaata tcatcgctga caaggccaag gagcacaagt tcaccatcat gatggggcgt     420
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gcctactctt gggacaacca agtagacttt aaaccacttc ttgaggcaga ttcagaagta    1200
acatcacgtc tcacacaaga agaaatcgat gaaatcttca acccagttta ttacaccaaa    1260
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&lt;210&gt; 587

&lt;211&gt; 918

&lt;212&gt; DNA

&lt;213&gt; Streptococcus pneumoniae

<400> 587  
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attactgggt taatcatggg agatgtgact actgggttac ttatcgggtg taacttgcaa 180  
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acaatcgctg taccagtagc agctctcttg acttacttcg acgttcttgg tcgtatgact 360  
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aaaaatagcc aaaaagtagc tgtagcagca ccttctacac catcagaaag tggggaaatc 900  
gaagatgacg aattctaa 918

<210> 588  
<211> 855  
<212> DNA  
<213> Streptococcus pneumoniae

<400> 588  
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tggaactacg aacgtatgca agcttctggt tacctttaca tgatcttgcc tcagttgcgt 180  
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ttcaatactt caccattctt ccataccatt atcgctgggt ttgaccttgc catggaagaa 300  
aaagatggtg taggttcaaa agacgccgtt aacggtatca agacagggtt gatgggacca 360  
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gcagcaacta tggctatcgc tggccaacct tgggggatct tcctttggat tgcagttgca 480

gtagcgtatg acatcttccg ttggaaacag ttggaatttg cttacaaaga aggggttaac 540  
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 gtcttcatga tgggtgctct ttagcaaca gtgattaact ttgaaatttc ttacaagttg 660  
 ccaatcgggtg aaaagatgat tgatttccaa gacatcttga accaaatctt cccacgtttg 720  
 cttccagcaa tctttactgc ctttatcttc tggttgcttg gtaagaaagg tatgaactct 780  
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<210> 589

<211> 1182

<212> DNA

<213> Streptococcus pneumoniae

<400> 589

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 caagcaaac gtgaagaaat tgcagccttc ctacaagaaa tcgctgataa acatgactat 180  
 attaagggtta tcttgacagg tgctgggact tctgcttatg tgggagatac cttgctacct 240  
 tattttaagg aagtctatga cgaacgcaaa tgggaatttc atgctattgc gacaacagat 300  
 atcgttgcca atccagcaac ctatttgaaa aaagatgtgg caactgtcct tgtgtctttt 360  
 gctcgtagtg ggaattcgcc tgaaagtgtg gcgactgttg atttggccaa atccttggtg 420  
 gatgagcttt atcaagtgc gattacttgt gcagcagatg gtaaatggc tcttcaagct 480  
 cacgggtgat atcgtaatct cttgctcttg caaccagctg tctctaatga tgctggattt 540  
 gccatgactt ctagctttac gtctatgatg ttgacaactc tcttggctct tgatcctaca 600  
 gaatttgctg ttaagtctga acgttttgaa gttgtatcta gtcttgccc taaagtttta 660  
 gacaaggcag aagatgtcaa agagctcgtt gatttagact ttaaccgtgt catctatcta 720  
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 ttgagtgatc aagctttttg tcttgaaaat gtcaaagaag tggcccttgg ttgtggcgg 1020

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 cgtgtagtac aagggtgcat aattcacgaa tatcaaaagt aa 1182

<210> 590  
 <211> 654  
 <212> DNA  
 <213> Streptococcus pneumoniae

<400> 590  
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 tacggtttgc aattggctga aaaacaaaaa cttcgtttca cttacgggtg aggtgaaaaa 240  
 caattccgta acttggtcgt acaagctaca aaaatcaaag gcggaatcct aggtttcaac 300  
 tttatgcttc ttttggaacg tcgtttggat aacgttgttt accgtcttgg tctcgcgact 360  
 actcgtcgtc aagctcgta attcgtaaac cacggtcaca tccttgttga cgggaaacgc 420  
 gttgatatcc catcataccg cgtaactcca ggtcaagtga tctcagttcg tgaaaaatca 480  
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 tcattcgacg ctgaaaaatt ggaaggttca ttgactcgct tgccagaacg cgacgaaatc 600  
 aaccagaaa tcaacgaagc acttgctcgt gaattctaca acaaatgtt gtaa 654

<210> 591  
 <211> 1032  
 <212> DNA  
 <213> Streptococcus pneumoniae

<400> 591  
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 cacttggctt tctgtaaate aatcggcctt aaaggccgta tcctagtcgc tgacgagga 180  
 attaacggaa cagtttcagg tgactatgaa acaactcaaa aatacatgga ctacgttcac 240  
 agccttccag gaatggaaga actctggttc aagattgacg aagaaaatga acaagccttc 300  
 aagaagatgt ttgttcgcta caagaaagaa attgtccacc ttggtttggg agacaacgac 360

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tttgacaatg acatcaaccc acttgaaaca acaggtgctt acttgtctcc aaaagagttc 420
aaagaagcgc ttcttgataa agataccggt gtccttgaca cacgtaacga ttatgagtac 480
gacctaggac atttccgtgg agctattcgc ccagatattc gcaacttccg tgagttacca 540
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ttgacacaag ctgaagttat cgagcgccta gccgctatcg gtgaaagctt ggatcaagca 1020
gctactgtat aa 1032

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&lt;210&gt; 592

&lt;211&gt; 216

&lt;212&gt; PRT

&lt;213&gt; Streptococcus pneumoniae

&lt;400&gt; 592

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Met Asn Ile Ala Val Ile Gly Leu Gly His Val Gly Leu Ala Tyr Ala
1           5           10           15

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Leu Leu Phe Ala Ser Lys Tyr Lys Val Val Ala Tyr Asp Ile Asp Ser
20           25           30

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Val Lys Ile Asn Asn Leu Lys Lys Gly Ile Leu Pro Ser Lys Asn Glu
35           40           45

```

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Glu Leu Met Lys Phe Phe Cys Glu Asn Asn Leu Asn Ile Thr Phe Phe
50           55           60

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```

Asp Thr Phe Ser Glu Ile Lys Asn Asn Ile Asp Tyr Tyr Ile Ile Ala
65           70           75           80

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Leu Pro Thr Asp Tyr Asp Glu Lys Ile Gly Ser Phe Asn Thr Tyr Glu
85           90           95

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Ile Glu Gln Thr Val Ser Lys Ile Leu Arg Val Lys Pro Asn Gly Lys  
 100 105 110

Ile Ile Leu Lys Ser Thr Val Pro Ile Gly Phe Ser Asn Lys Leu Lys  
 115 120 125

Arg Leu Phe Asp Thr Lys Asn Ile Ile Phe Val Pro Glu Phe Leu Arg  
 130 135 140

Glu Gly Cys Ser Ile Tyr Asp Asn Leu Tyr Pro Ser Arg Ile Val Val  
 145 150 155 160

Gly Asp Glu Thr Val Glu Gly Arg Lys Ile Ala Glu Leu Phe Leu Ser  
 165 170 175

Ile Ser Thr His Ser Thr Ala Asn Ile Lys Asn Val Met Leu Val Ser  
 180 185 190

Pro Thr Glu Ala Glu Ala Ile Lys Leu Phe Ser Asn Thr Phe Leu Ala  
 195 200 205

Leu Arg Val Ala Phe Leu Met Asn  
 210 215

<210> 593  
 <211> 234  
 <212> PRT  
 <213> Streptococcus pneumoniae

<400> 593

Met Val Leu Arg Gly Val Pro Met Ser Gln Ile Asp Leu Gln Lys Leu  
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Thr Lys Lys Asn Gln Glu Phe Val His Ile Ala Thr Gln Gln Phe Ile  
 20 25 30

Lys Asp Gly Lys Thr Asp Ala Glu Ile Gln Thr Ile Phe Glu Glu Val  
 35 40 45

Ile Pro Gln Ile Leu Glu Glu Gln Ser Lys Gly Thr Thr Ala Arg Ser  
 50 55 60

Leu Tyr Gly Ala Pro Thr His Trp Ala His Ser Phe Thr Val Lys Glu  
65 70 75 80

Gln Tyr Glu Lys Glu His Pro Lys Glu Asn Asp Asp Pro Lys Leu Met  
85 90 95

Ile Met Asp Ser Ala Leu Phe Ile Thr Ser Leu Phe Ala Leu Val Ser  
100 105 110

Ala Leu Thr Thr Phe Phe Ala Ala Asp Gln Ala Phe Gly Tyr Gly Leu  
115 120 125

Ile Thr Leu Leu Leu Val Gly Leu Val Gly Gly Phe Ala Phe Tyr Leu  
130 135 140

Met Tyr Tyr Phe Val Tyr Gln Tyr Tyr Gly Pro Asp Met Asp Arg Ser  
145 150 155 160

Gln Arg Pro Pro Phe Trp Lys Ser Val Leu Val Ile Leu Ala Ser Met  
165 170 175

Phe Leu Trp Leu Leu Val Phe Phe Ala Thr Ser Phe Leu Pro Ala Ser  
180 185 190

Leu Asn Pro Val Leu Asp Pro Leu Pro Leu Ala Ile Ile Gly Ala Ala  
195 200 205

Leu Leu Ala Leu Arg Phe Tyr Leu Lys Lys Arg Leu Asn Ile Arg Ser  
210 215 220

Ala Ser Ala Gly Pro Thr Arg Tyr Gln Glu  
225 230

<210> 594

<211> 314

<212> PRT

<213> Streptococcus pneumoniae

<400> 594

Met Lys Gln Val Phe Leu Ser Thr Thr Thr Glu Phe Lys Glu Ile Asp  
1 5 10 15



Thr Leu Glu Pro Gly Thr Trp Ile Asn Leu Val Asn Pro Thr Gln Asn  
 20 25 30

Glu Ser Leu Glu Ile Ala Asn Thr Phe Asp Ile Asp Ile Ala Asp Leu  
 35 40 45

Arg Ala Pro Leu Asp Ala Glu Glu Met Ser Arg Ile Thr Ile Glu Asp  
 50 55 60

Glu Tyr Thr Leu Ile Ile Val Asp Val Pro Val Thr Glu Glu Arg Asn  
 65 70 75 80

Asn Arg Thr Tyr Tyr Val Thr Ile Pro Leu Gly Ile Ile Ile Thr Glu  
 85 90 95

Glu Thr Ile Ile Thr Thr Cys Leu Glu Pro Leu Pro Val Leu Asp Val  
 100 105 110

Phe Ile Asn Arg Arg Leu Arg Asn Phe Tyr Thr Phe Met Arg Ser Arg  
 115 120 125

Phe Ile Phe Gln Ile Leu Tyr Arg Asn Ala Glu Leu Tyr Leu Thr Ala  
 130 135 140

Leu Arg Ser Ile Asp Arg Lys Ser Glu Gln Ile Glu Ser Gln Leu His  
 145 150 155 160

Gln Ser Thr Arg Asn Glu Glu Leu Ile Glu Leu Met Glu Leu Glu Lys  
 165 170 175

Thr Ile Val Tyr Phe Lys Ala Ser Leu Lys Thr Asn Glu Arg Val Ile  
 180 185 190

Lys Lys Leu Thr Ser Ser Thr Ser Asn Ile Lys Lys Tyr Leu Glu Asp  
 195 200 205

Glu Asp Leu Leu Glu Asp Thr Leu Ile Glu Thr Gln Gln Ala Ile Glu  
 210 215 220

Met Ala Asp Ile Tyr Gly Asn Val Leu His Ser Met Thr Glu Thr Phe  
 225 230 235 240

Ala Ser Ile Ile Ser Asn Asn Gln Asn Asn Ile Met Lys Thr Leu Ala  
 245 250 255

Leu Val Thr Ile Val Met Ser Ile Pro Thr Met Val Phe Ser Ala Tyr  
 260 265 270

Gly Met Asn Phe Lys Asp Asn Glu Ile Pro Leu Asn Gly Glu Pro Asn  
 275 280 285

Ala Phe Trp Leu Ile Val Phe Ile Ala Phe Ala Met Ser Val Ser Leu  
 290 295 300

Thr Leu Tyr Leu Ile His Lys Lys Trp Phe  
 305 310

<210> 595

<211> 102

<212> PRT

<213> Streptococcus pneumoniae

<400> 595

Met Ala Asn Lys Lys Ile Arg Ile Arg Leu Lys Ala Tyr Glu His Arg  
 1 5 10 15

Thr Leu Asp Thr Ala Ala Ala Lys Ile Val Glu Ser Ala Thr Arg Thr  
 20 25 30

Gly Ala Gln Val Ala Gly Pro Ile Pro Leu Pro Thr Glu Arg Ser Leu  
 35 40 45

Tyr Thr Ile Ile Arg Ala Thr His Lys Tyr Lys Asp Ser Arg Glu Gln  
 50 55 60

Phe Glu Met Arg Thr His Lys Arg Leu Ile Asp Ile Val Asn Pro Thr  
 65 70 75 80

Gln Lys Thr Val Asp Ala Leu Met Lys Leu Asp Leu Pro Ser Gly Val  
 85 90 95

Asn Val Glu Ile Lys Leu  
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<210> 596  
 <211> 208  
 <212> PRT  
 <213> Streptococcus pneumoniae

<400> 596

Met Thr Lys Gly Ile Leu Gly Lys Lys Val Gly Met Thr Gln Ile Phe  
 1 5 10 15

Thr Glu Ala Gly Glu Leu Ile Pro Val Thr Val Ile Glu Ala Thr Pro  
 20 25 30

Asn Val Val Leu Gln Val Lys Thr Val Glu Thr Asp Gly Tyr Asn Ala  
 35 40 45

Ile Gln Val Gly Phe Asp Asp Lys Arg Glu Val Leu Ser Asn Lys Pro  
 50 55 60

Ala Lys Gly His Val Ala Lys Ala Asn Thr Ala Pro Lys Arg Phe Ile  
 65 70 75 80

Arg Glu Phe Lys Asn Val Glu Gly Leu Glu Val Gly Ala Glu Ile Thr  
 85 90 95

Val Glu Thr Phe Ala Ala Gly Asp Val Val Asp Val Thr Gly Thr Ser  
 100 105 110

Lys Gly Lys Gly Phe Gln Gly Val Ile Lys Arg His Gly Gln Ser Arg  
 115 120 125

Gly Pro Met Ala His Gly Ser Arg Tyr His Arg Arg Pro Gly Ser Met  
 130 135 140

Gly Pro Val Ala Pro Asn Arg Val Phe Lys Gly Lys Asn Leu Ala Gly  
 145 150 155 160

Arg Met Gly Gly Asp Arg Val Thr Ile Gln Asn Leu Glu Val Val Gln  
 165 170 175

Val Val Pro Glu Lys Asn Val Ile Leu Ile Lys Gly Asn Val Pro Gly  
 180 185 190

Ala Lys Lys Ser Leu Ile Thr Ile Lys Ser Ala Val Lys Ala Gly Lys  
 195 200 205

<210> 597

<211> 207

<212> PRT

<213> Streptococcus pneumoniae

<400> 597

Met Ala Asn Val Thr Leu Phe Asp Gln Thr Gly Lys Glu Ala Gly Gln  
 1 5 10 15

Val Val Leu Ser Asp Ala Val Phe Gly Ile Glu Pro Asn Glu Ser Val  
 20 25 30

Val Phe Asp Val Ile Ile Ser Gln Arg Ala Ser Leu Arg Gln Gly Thr  
 35 40 45

His Ala Val Lys Asn Arg Ser Ala Val Ser Gly Gly Gly Arg Lys Pro  
 50 55 60

Trp Arg Gln Lys Gly Thr Gly Arg Ala Arg Gln Gly Ser Ile Arg Ser  
 65 70 75 80

Pro Gln Trp Arg Gly Gly Gly Val Val Phe Gly Pro Thr Pro Arg Ser  
 85 90 95

Tyr Gly Tyr Lys Leu Pro Gln Lys Val Arg Arg Leu Ala Leu Lys Ser  
 100 105 110

Val Tyr Ser Glu Lys Val Ala Glu Asn Lys Phe Val Ala Val Asp Ala  
 115 120 125

Leu Ser Phe Thr Ala Pro Lys Thr Ala Glu Phe Ala Lys Val Leu Ala  
 130 135 140

Ala Leu Ser Ile Asp Ser Lys Val Leu Val Ile Leu Glu Glu Gly Asn  
 145 150 155 160

Glu Phe Ala Ala Leu Ser Ala Arg Asn Leu Pro Asn Val Lys Val Ala  
 165 170 175

Thr Ala Thr Thr Ala Ser Val Leu Asp Ile Ala Asn Ser Asp Lys Leu  
 180 185 190

Leu Val Thr Gln Ala Ala Ile Ser Lys Ile Glu Glu Val Leu Ala  
 195 200 205

<210> 598  
 <211> 98  
 <212> PRT  
 <213> Streptococcus pneumoniae

<400> 598

Met Asn Leu Tyr Asp Val Ile Lys Lys Pro Val Ile Thr Glu Ser Ser  
 1 5 10 15

Met Ala Gln Leu Glu Ala Gly Lys Tyr Val Phe Glu Val Asp Thr Arg  
 20 25 30

Ala His Lys Leu Leu Ile Lys Gln Ala Val Glu Ala Ala Phe Glu Gly  
 35 40 45

Val Lys Val Ala Asn Val Asn Thr Ile Asn Val Lys Pro Lys Ala Lys  
 50 55 60

Arg Val Gly Arg Tyr Thr Gly Phe Thr Asn Lys Thr Lys Lys Ala Ile  
 65 70 75 80

Ile Thr Leu Thr Ala Asp Ser Lys Ala Ile Glu Leu Phe Ala Ala Glu  
 85 90 95

Ala Glu

<210> 599  
 <211> 277  
 <212> PRT  
 <213> Streptococcus pneumoniae

<400> 599

Met Gly Ile Arg Val Tyr Lys Pro Thr Thr Asn Gly Arg Arg Asn Met  
 1 5 10 15

Thr Ser Leu Asp Phe Ala Glu Ile Thr Thr Ser Thr Pro Glu Lys Ser  
 20 25 30

Leu Leu Val Ala Leu Lys Ser Lys Ala Gly Arg Asn Asn Asn Gly Arg  
 35 40 45

Ile Thr Val Arg His Gln Gly Gly Gly His Lys Arg Phe Tyr Arg Leu  
 50 55 60

Val Asp Phe Lys Arg Asn Lys Asp Asn Val Glu Ala Val Val Lys Thr  
 65 70 75 80

Ile Glu Tyr Asp Pro Asn Arg Ser Ala Asn Ile Ala Leu Val His Tyr  
 85 90 95

Thr Asp Gly Val Lys Ala Tyr Ile Ile Ala Pro Lys Gly Leu Glu Val  
 100 105 110

Gly Gln Arg Ile Val Ser Gly Pro Glu Ala Asp Ile Lys Val Gly Asn  
 115 120 125

Ala Leu Pro Leu Ala Asn Ile Pro Val Gly Thr Leu Ile His Asn Ile  
 130 135 140

Glu Leu Lys Pro Gly Arg Gly Gly Glu Leu Val Arg Ala Ala Gly Ala  
 145 150 155 160

Ser Ala Gln Val Leu Gly Ser Glu Gly Lys Tyr Val Leu Val Arg Leu  
 165 170 175

Gln Ser Gly Glu Val Arg Met Ile Leu Gly Thr Cys Arg Ala Thr Val  
 180 185 190

Gly Val Val Gly Asn Glu Gln His Gly Leu Val Asn Leu Gly Lys Ala  
 195 200 205

Gly Arg Ser Arg Trp Lys Gly Ile Arg Pro Thr Val Arg Gly Ser Val  
 210 215 220

Met Asn Pro Asn Asp His Pro His Gly Gly Gly Glu Gly Lys Ala Pro  
 225 230 235 240

Val Gly Arg Lys Ala Pro Ser Thr Pro Trp Gly Lys Pro Ala Leu Gly  
 245 250 255

Leu Lys Thr Arg Asn Lys Lys Ala Lys Ser Asp Lys Leu Ile Val Arg  
 260 265 270

Arg Arg Asn Glu Lys  
 275

<210> 600  
 <211> 93  
 <212> PRT  
 <213> Streptococcus pneumoniae

<400> 600

Met Gly Arg Ser Leu Lys Lys Gly Pro Phe Val Asp Glu His Leu Met  
 1 5 10 15

Lys Lys Val Glu Ala Gln Ala Asn Asp Glu Lys Lys Lys Val Ile Lys  
 20 25 30

Thr Trp Ser Arg Arg Ser Thr Ile Phe Pro Ser Phe Ile Gly Tyr Thr  
 35 40 45

Ile Ala Val Tyr Asp Gly Arg Lys His Val Pro Val Tyr Ile Gln Glu  
 50 55 60

Asp Met Val Gly His Lys Leu Gly Glu Phe Ala Pro Thr Arg Thr Tyr  
 65 70 75 80

Lys Gly His Ala Ala Asp Asp Lys Lys Thr Arg Arg Lys  
 85 90

<210> 601  
 <211> 114  
 <212> PRT  
 <213> Streptococcus pneumoniae

<400> 601

Met Ala Glu Ile Thr Ser Ala Lys Ala Met Ala Arg Thr Val Arg Val  
 1 5 10 15

Ser Pro Arg Lys Ser Arg Leu Val Leu Asp Asn Ile Arg Gly Lys Ser  
 20 25 30

Val Ala Asp Ala Ile Ala Ile Leu Thr Phe Thr Pro Asn Lys Ala Ala  
 35 40 45

Glu Ile Ile Leu Lys Val Leu Asn Ser Ala Val Ala Asn Ala Glu Asn  
 50 55 60

Asn Phe Gly Leu Asp Lys Ala Asn Leu Val Val Ser Glu Ala Phe Ala  
 65 70 75 80

Asn Glu Gly Pro Thr Met Lys Arg Phe Arg Pro Arg Ala Lys Gly Ser  
 85 90 95

Ala Ser Pro Ile Asn Lys Arg Thr Ala His Ile Thr Val Ala Val Ala  
 100 105 110

Glu Lys

<210> 602  
 <211> 217  
 <212> PRT  
 <213> Streptococcus pneumoniae

<400> 602

Met Gly Gln Lys Val His Pro Ile Gly Met Arg Val Gly Ile Ile Arg  
 1 5 10 15

Asp Trp Asp Ala Lys Trp Tyr Ala Glu Lys Glu Tyr Ala Asp Tyr Leu  
 20 25 30

His Glu Asp Leu Ala Ile Arg Lys Phe Val Gln Lys Glu Leu Ala Asp  
 35 40 45

Ala Ala Val Ser Thr Ile Glu Ile Glu Arg Ala Val Asn Lys Val Asn  
 50 55 60

Val Ser Leu His Thr Ala Lys Pro Gly Met Val Ile Gly Lys Gly Gly  
 65 70 75 80



Ala Asn Val Asp Ala Leu Arg Ala Lys Leu Asn Lys Leu Thr Gly Lys  
85 90 95

Gln Val His Ile Asn Ile Ile Glu Ile Lys Gln Pro Asp Leu Asp Ala  
100 105 110

His Leu Val Gly Glu Gly Ile Ala Arg Gln Leu Glu Gln Arg Val Ala  
115 120 125

Phe Arg Arg Ala Gln Lys Gln Ala Ile Gln Arg Ala Met Arg Ala Gly  
130 135 140

Ala Lys Gly Ile Lys Thr Gln Val Ser Gly Arg Leu Asn Gly Ala Asp  
145 150 155 160

Ile Ala Arg Ala Glu Gly Tyr Ser Glu Gly Thr Val Pro Leu His Thr  
165 170 175

Leu Arg Ala Asp Ile Asp Tyr Ala Trp Glu Glu Ala Asp Thr Thr Tyr  
180 185 190

Gly Lys Leu Gly Val Lys Val Trp Ile Tyr Arg Gly Glu Val Leu Pro  
195 200 205

Ala Arg Lys Asn Thr Lys Gly Gly Lys  
210 215

<210> 603

<211> 122

<212> PRT

<213> Streptococcus pneumoniae

<400> 603

Met Ile Gln Thr Glu Thr Arg Leu Lys Val Ala Asp Asn Ser Gly Ala  
1 5 10 15

Arg Glu Ile Leu Thr Ile Lys Val Leu Gly Gly Ser Gly Arg Lys Phe  
20 25 30

Ala Asn Ile Gly Asp Val Ile Val Ala Ser Val Lys Gln Ala Thr Pro  
35 40 45

Gly Gly Ala Val Lys Lys Gly Asp Val Val Lys Ala Val Ile Val Arg  
 50 55 60

Thr Lys Ser Gly Ala Arg Arg Ala Asp Gly Ser Tyr Ile Lys Phe Asp  
 65 70 75 80

Glu Asn Ala Ala Val Ile Ile Arg Glu Asp Lys Thr Pro Arg Gly Thr  
 85 90 95

Arg Ile Phe Gly Pro Val Ala Arg Glu Leu Arg Glu Gly Gly Phe Met  
 100 105 110

Lys Ile Val Ser Leu Ala Pro Glu Val Leu  
 115 120

<210> 604

<211> 101

<212> PRT

<213> Streptococcus pneumoniae

<400> 604

Met Phe Val Lys Lys Gly Asp Lys Val Arg Val Ile Ala Gly Lys Asp  
 1 5 10 15

Lys Gly Thr Glu Ala Val Val Leu Thr Ala Leu Pro Lys Val Asn Lys  
 20 25 30

Val Ile Val Glu Gly Val Asn Ile Val Lys Lys His Gln Arg Pro Thr  
 35 40 45

Asn Glu Leu Pro Gln Gly Gly Ile Ile Glu Lys Glu Ala Ala Ile His  
 50 55 60

Val Ser Asn Val Gln Val Leu Asp Lys Asn Gly Val Ala Gly Arg Val  
 65 70 75 80

Gly Tyr Lys Phe Val Asp Gly Lys Lys Val Arg Tyr Asn Lys Lys Ser  
 85 90 95

Gly Glu Val Leu Asp  
 100

<210> 605  
 <211> 180  
 <212> PRT  
 <213> Streptococcus pneumoniae

<400> 605

Met Ala Asn Arg Leu Lys Glu Lys Tyr Leu Asn Glu Val Val Pro Ala  
 1 5 10 15

Leu Thr Glu Gln Phe Asn Tyr Ser Ser Val Met Ala Val Pro Lys Val  
 20 25 30

Asp Lys Ile Val Leu Asn Met Gly Val Gly Glu Ala Val Ser Asn Ala  
 35 40 45

Lys Ser Leu Glu Lys Ala Ala Glu Glu Leu Ala Leu Ile Ser Gly Gln  
 50 55 60

Lys Pro Leu Ile Thr Lys Ala Lys Lys Ser Ile Ala Gly Phe Arg Leu  
 65 70 75 80

Arg Glu Gly Val Ala Ile Gly Ala Lys Val Thr Leu Arg Gly Glu Arg  
 85 90 95

Met Tyr Glu Phe Leu Asp Lys Leu Val Ser Val Ser Leu Pro Arg Val  
 100 105 110

Arg Asp Phe His Gly Val Pro Thr Lys Ser Phe Asp Gly Arg Gly Asn  
 115 120 125

Tyr Thr Leu Gly Val Lys Glu Gln Leu Ile Phe Pro Glu Ile Asn Phe  
 130 135 140

Asp Asp Val Asp Lys Thr Arg Gly Leu Asp Ile Val Ile Val Thr Thr  
 145 150 155 160

Ala Asn Thr Asp Glu Glu Ser Arg Ala Leu Leu Thr Gly Leu Gly Met  
 165 170 175

Pro Phe Ala Lys  
 180

<210> 606  
 <211> 132  
 <212> PRT  
 <213> Streptococcus pneumoniae

<400> 606

Met Val Met Thr Asp Pro Ile Ala Asp Phe Leu Thr Arg Ile Arg Asn  
 1 5 10 15

Ala Asn Gln Ala Lys His Glu Val Leu Glu Val Pro Ala Ser Asn Ile  
 20 25 30

Lys Lys Gly Ile Ala Glu Ile Leu Lys Arg Glu Gly Phe Val Lys Asn  
 35 40 45

Val Glu Ile Ile Glu Asp Asp Lys Gln Gly Val Ile Arg Val Phe Leu  
 50 55 60

Lys Tyr Gly Pro Asn Gly Glu Lys Val Ile Thr Asn Leu Lys Arg Val  
 65 70 75 80

Ser Lys Pro Gly Leu Arg Val Tyr Lys Lys Arg Glu Asp Leu Pro Lys  
 85 90 95

Val Leu Asn Gly Leu Gly Ile Ala Ile Leu Ser Thr Ser Glu Gly Leu  
 100 105 110

Leu Thr Asp Lys Glu Ala Arg Gln Lys Asn Val Gly Gly Glu Val Ile  
 115 120 125

Ala Tyr Val Trp  
 130

<210> 607  
 <211> 178  
 <212> PRT  
 <213> Streptococcus pneumoniae

<400> 607

Met Ser Arg Ile Gly Asn Lys Val Ile Val Leu Pro Ala Gly Val Glu  
 1 5 10 15

Leu Ala Asn Asn Asp Asn Val Val Thr Val Lys Gly Ser Lys Gly Glu  
                   20                                  25                                  30

Leu Thr Arg Glu Phe Ser Lys Asp Ile Glu Ile Arg Val Glu Gly Thr  
           35                                  40                                  45

Glu Ile Thr Leu His Arg Pro Asn Asp Ser Lys Glu Met Lys Thr Ile  
       50                                  55                                  60

His Gly Thr Thr Arg Ala Leu Leu Asn Asn Met Val Val Gly Val Ser  
   65                                  70                                  75                                  80

Glu Gly Phe Lys Lys Glu Leu Glu Met Arg Gly Val Gly Tyr Arg Ala  
                   85                                  90                                  95

Gln Leu Gln Gly Ser Lys Leu Val Leu Ala Val Gly Lys Ser His Pro  
                   100                                  105                                  110

Asp Glu Val Glu Ala Pro Glu Gly Ile Thr Phe Glu Leu Pro Asn Pro  
       115                                  120                                  125

Thr Thr Ile Val Val Ser Gly Ile Ser Lys Glu Val Val Gly Gln Thr  
   130                                  135                                  140

Ala Ala Tyr Val Arg Ser Leu Arg Ser Pro Glu Pro Tyr Lys Gly Lys  
   145                                  150                                  155                                  160

Gly Ile Arg Tyr Val Gly Glu Phe Val Arg Arg Lys Glu Gly Lys Thr  
                   165                                  170                                  175

Gly Lys

<210> 608

<211> 118

<212> PRT

<213> Streptococcus pneumoniae

<400> 608

Met Ile Ser Lys Pro Asp Lys Asn Lys Leu Arg Gln Lys Arg His Arg  
   1                  5                                  10                                  15

Arg Val Arg Gly Lys Leu Ser Gly Thr Ala Asp Arg Pro Arg Leu Asn  
 20 25 30

Val Phe Arg Ser Asn Thr Gly Ile Tyr Ala Gln Val Ile Asp Asp Val  
 35 40 45

Ala Gly Val Thr Leu Ala Ser Ala Ser Thr Leu Asp Lys Glu Val Ser  
 50 55 60

Lys Gly Thr Lys Thr Glu Gln Ala Val Ala Val Gly Lys Leu Val Ala  
 65 70 75 80

Glu Arg Ala Asn Ala Lys Gly Ile Ser Glu Val Val Phe Asp Arg Gly  
 85 90 95

Gly Tyr Leu Tyr His Gly Arg Val Lys Ala Leu Ala Asp Ala Ala Arg  
 100 105 110

Glu Asn Gly Leu Lys Phe  
 115

<210> 609

<211> 164

<212> PRT

<213> Streptococcus pneumoniae

<400> 609

Met Ala Phe Lys Asp Asn Ala Val Glu Leu Glu Glu Arg Val Val Ala  
 1 5 10 15

Val Asn Arg Val Thr Lys Val Val Lys Gly Gly Arg Arg Leu Arg Phe  
 20 25 30

Ala Ala Leu Val Val Val Gly Asp His Asn Gly Arg Val Gly Phe Gly  
 35 40 45

Thr Gly Lys Ala Gln Glu Val Pro Glu Ala Ile Arg Lys Ala Val Asp  
 50 55 60

Asp Ala Lys Lys Asn Leu Ile Glu Val Pro Met Val Gly Thr Thr Ile  
 65 70 75 80

Pro His Glu Val Leu Ser Glu Phe Gly Gly Ala Lys Val Leu Leu Lys  
                     85                    90                    95

Pro Ala Val Glu Gly Ser Gly Val Ala Ala Gly Gly Ala Val Arg Ala  
                     100                    105                    110

Val Val Glu Leu Ala Gly Val Ala Asp Ile Thr Ser Lys Ser Leu Gly  
                     115                    120                    125

Ser Asn Thr Pro Ile Asn Ile Val Arg Ala Thr Val Glu Gly Leu Lys  
                     130                    135                    140

Gln Leu Lys Arg Ala Glu Glu Ile Ala Ala Leu Arg Gly Ile Ser Val  
                     145                    150                    155                    160

Ser Asp Leu Ala

<210> 610

<211> 146

<212> PRT

<213> Streptococcus pneumoniae

<400> 610

Met Lys Leu His Glu Leu Lys Pro Ala Glu Gly Ser Arg Lys Val Arg  
                     1                    5                    10                    15

Asn Arg Val Gly Arg Gly Thr Ser Ser Gly Asn Gly Lys Thr Ser Gly  
                     20                    25                    30

Arg Gly Gln Lys Gly Gln Lys Ala Arg Ser Gly Gly Gly Val Arg Leu  
                     35                    40                    45

Gly Phe Glu Gly Gly Gln Thr Pro Leu Phe Arg Arg Leu Pro Lys Arg  
                     50                    55                    60

Gly Phe Thr Asn Ile Asn Ala Lys Glu Tyr Ala Ile Val Asn Leu Asp  
                     65                    70                    75                    80

Gln Leu Asn Val Phe Glu Asp Gly Ala Glu Val Thr Pro Val Val Leu  
                     85                    90                    95

Ile Glu Ala Gly Ile Val Lys Ala Glu Lys Ser Gly Ile Lys Ile Leu  
                   100                  105                  110

Gly Asn Gly Glu Leu Thr Lys Lys Leu Thr Val Lys Ala Ala Lys Phe  
                   115                  120                  125

Ser Lys Ser Ala Glu Glu Ala Ile Thr Ala Lys Gly Gly Ser Val Glu  
           130                  135                  140

Val Ile  
 145

<210> 611  
 <211> 436  
 <212> PRT  
 <213> Streptococcus pneumoniae

<400> 611

Met Phe Phe Lys Leu Leu Arg Glu Ala Leu Lys Val Lys Gln Val Arg  
 1                  5                  10                  15

Ser Lys Ile Leu Phe Thr Ile Phe Ile Val Leu Val Phe Arg Ile Gly  
                   20                  25                  30

Thr Ser Ile Thr Val Pro Gly Val Asn Ala Asn Ser Leu Asn Ala Leu  
           35                  40                  45

Ser Gly Leu Ser Phe Leu Asn Met Leu Ser Leu Val Ser Gly Asn Ala  
           50                  55                  60

Leu Lys Asn Phe Ser Ile Phe Ala Leu Gly Val Ser Pro Tyr Ile Thr  
 65                  70                  75                  80

Ala Ser Ile Val Val Gln Leu Leu Gln Met Asp Ile Leu Pro Lys Phe  
                   85                  90                  95

Val Glu Trp Gly Lys Gln Gly Glu Val Gly Arg Arg Lys Leu Asn Gln  
                   100                  105                  110

Ala Thr Arg Tyr Ile Ala Leu Val Leu Ala Phe Val Gln Ser Ile Gly  
           115                  120                  125



Ile Thr Ala Gly Phe Asn Thr Leu Ala Gly Ala Gln Leu Ile Lys Thr  
 130 135 140

Ala Leu Thr Pro Gln Val Phe Leu Thr Ile Gly Ile Ile Leu Thr Ala  
 145 150 155 160

Gly Ser Met Ile Val Thr Trp Leu Gly Glu Gln Ile Thr Asp Lys Gly  
 165 170 175

Tyr Gly Asn Gly Val Ser Met Ile Ile Phe Ala Gly Ile Val Ser Ser  
 180 185 190

Ile Pro Glu Met Ile Gln Gly Ile Tyr Val Asp Tyr Phe Val Asn Val  
 195 200 205

Pro Ser Ser Arg Ile Thr Ser Ser Ile Ile Phe Val Ile Ile Leu Ile  
 210 215 220

Ile Thr Val Leu Leu Ile Ile Tyr Phe Thr Thr Tyr Val Gln Gln Ala  
 225 230 235 240

Glu Tyr Lys Ile Pro Ile Gln Tyr Thr Lys Val Ala Gln Gly Ala Pro  
 245 250 255

Ser Ser Ser Tyr Leu Pro Leu Lys Val Asn Pro Ala Gly Val Ile Pro  
 260 265 270

Val Ile Phe Ala Ser Ser Ile Thr Ala Ala Pro Ala Ala Ile Leu Gln  
 275 280 285

Phe Leu Ser Ala Thr Gly His Asp Trp Ala Trp Val Arg Val Ala Gln  
 290 295 300

Glu Met Leu Ala Thr Thr Ser Pro Thr Gly Ile Ala Met Tyr Ala Leu  
 305 310 315 320

Leu Ile Ile Leu Phe Thr Phe Phe Tyr Thr Phe Val Gln Ile Asn Pro  
 325 330 335

Glu Lys Ala Ala Glu Ser Leu Gln Lys Ser Gly Ala Tyr Ile His Gly  
 340 345 350

Val Arg Pro Gly Lys Gly Thr Glu Glu Tyr Met Ser Lys Leu Leu Arg  
 355 360 365

Arg Leu Ala Thr Val Gly Ser Leu Phe Leu Gly Val Ile Ser Ile Leu  
 370 375 380

Pro Ile Ala Ala Lys Asp Val Phe Gly Leu Ser Asp Val Val Ala Phe  
 385 390 395 400

Gly Gly Thr Ser Leu Leu Ile Ile Ile Ser Thr Gly Ile Glu Gly Ile  
 405 410 415

Lys Gln Leu Glu Gly Tyr Leu Leu Lys Arg Lys Tyr Val Gly Phe Met  
 420 425 430

Asp Arg Thr Glu  
 435

<210> 612

<211> 212

<212> PRT

<213> Streptococcus pneumoniae

<400> 612

Met Asn Leu Leu Ile Met Gly Leu Pro Gly Ala Gly Lys Gly Thr Gln  
 1 5 10 15

Ala Ala Lys Ile Val Glu Gln Phe His Val Ala His Ile Ser Thr Gly  
 20 25 30

Asp Met Phe Arg Ala Ala Met Ala Asn Gln Thr Glu Met Gly Val Leu  
 35 40 45

Ala Lys Ser Tyr Ile Asp Lys Gly Glu Leu Val Pro Asp Glu Val Thr  
 50 55 60

Asn Gly Ile Val Lys Glu Arg Leu Ser Gln Asp Asp Ile Lys Glu Thr  
 65 70 75 80

Gly Phe Leu Leu Asp Gly Tyr Pro Arg Thr Ile Glu Gln Ala His Ala  
 85 90 95

Leu Asp Lys Thr Leu Ala Glu Leu Gly Ile Glu Leu Glu Gly Val Ile  
 100 105 110

Asn Ile Glu Val Asn Pro Asp Ser Leu Leu Glu Arg Leu Ser Gly Arg  
 115 120 125

Ile Ile His Arg Val Thr Gly Glu Thr Phe His Lys Val Phe Asn Pro  
 130 135 140

Pro Val Asp Tyr Lys Glu Glu Asp Tyr Tyr Gln Arg Glu Asp Asp Lys  
 145 150 155 160

Pro Glu Thr Val Lys Arg Arg Leu Asp Val Asn Ile Ala Gln Gly Glu  
 165 170 175

Pro Ile Ile Ala His Tyr Arg Ala Lys Gly Leu Val His Asp Ile Glu  
 180 185 190

Gly Asn Gln Asp Ile Asn Asp Val Phe Ser Asp Ile Glu Lys Val Leu  
 195 200 205

Thr Asn Leu Lys  
 210

<210> 613  
 <211> 121  
 <212> PRT  
 <213> Streptococcus pneumoniae

<400> 613

Met Ala Arg Ile Ala Gly Val Asp Ile Pro Asn Asp Lys Arg Val Val  
 1 5 10 15

Ile Ser Leu Thr Tyr Val Tyr Gly Ile Gly Leu Ala Thr Ser Lys Lys  
 20 25 30

Ile Leu Ala Ala Ala Gly Ile Ser Glu Asp Val Arg Val Arg Asp Leu  
 35 40 45

Thr Ser Asp Gln Glu Asp Ala Ile Arg Arg Glu Val Asp Ala Ile Lys  
 50 55 60

Val Glu Gly Asp Leu Arg Arg Glu Val Asn Leu Asn Ile Lys Arg Leu  
65 70 75 80

Met Glu Ile Gly Ser Tyr Arg Gly Ile Arg His Arg Arg Gly Leu Pro  
85 90 95

Val Arg Gly Gln Asn Thr Lys Asn Asn Ala Arg Thr Arg Lys Gly Lys  
100 105 110

Ala Val Ala Ile Ala Gly Lys Lys Lys  
115 120

<210> 614

<211> 127

<212> PRT

<213> Streptococcus pneumoniae

<400> 614

Met Ala Lys Pro Thr Arg Lys Arg Arg Val Lys Lys Asn Ile Glu Ser  
1 5 10 15

Gly Ile Ala His Ile His Ala Thr Phe Asn Asn Thr Ile Val Met Ile  
20 25 30

Thr Asp Val His Gly Asn Ala Ile Ala Trp Ser Ser Ala Gly Ala Leu  
35 40 45

Gly Phe Lys Gly Ser Arg Lys Ser Thr Pro Phe Ala Ala Gln Met Ala  
50 55 60

Ser Glu Ala Ala Ala Lys Ser Ala Gln Glu His Gly Leu Lys Ser Val  
65 70 75 80

Glu Val Thr Val Lys Gly Pro Gly Ser Gly Arg Glu Ser Ala Ile Arg  
85 90 95

Ala Leu Ala Ala Ala Gly Leu Glu Val Thr Ala Ile Arg Asp Val Thr  
100 105 110

Pro Val Pro His Asn Gly Ala Arg Pro Pro Lys Arg Arg Arg Val  
115 120 125

<210> 615  
 <211> 128  
 <212> PRT  
 <213> Streptococcus pneumoniae

<400> 615

Met Ala Tyr Arg Lys Leu Gly Arg Thr Ser Ser Gln Arg Lys Ala Met  
 1 5 10 15

Leu Arg Asp Leu Thr Thr Asp Leu Leu Ile Asn Glu Ser Ile Val Thr  
 20 25 30

Thr Glu Ala Arg Ala Lys Glu Ile Arg Lys Thr Val Glu Lys Met Ile  
 35 40 45

Thr Leu Gly Lys Arg Gly Asp Leu His Ala Arg Arg Gln Ala Ala Ala  
 50 55 60

Phe Val Arg Asn Glu Ile Ala Ser Glu Asn Tyr Asp Glu Ala Thr Asp  
 65 70 75 80

Lys Tyr Thr Ser Thr Thr Ala Leu Gln Lys Leu Phe Ser Glu Ile Ala  
 85 90 95

Pro Arg Tyr Ala Glu Arg Asn Gly Gly Tyr Thr Arg Ile Leu Lys Thr  
 100 105 110

Glu Ser Arg Arg Gly Asp Ala Ala Pro Met Ala Ile Ile Glu Leu Val  
 115 120 125

<210> 616  
 <211> 137  
 <212> PRT  
 <213> Streptococcus pneumoniae

<400> 616

Met Pro Thr Ile Asn Gln Leu Val Arg Lys Pro Arg Lys Ser Lys Val  
 1 5 10 15

Glu Lys Ser Lys Ser Pro Ala Leu Asn Val Gly Tyr Asn Ser His Lys  
 20 25 30

Lys Val Gln Thr Asn Val Ser Ser Pro Gln Lys Arg Gly Val Ala Thr  
 35 40 45

Arg Val Gly Thr Met Thr Pro Lys Lys Pro Asn Ser Ala Leu Arg Lys  
 50 55 60

Phe Ala Arg Val Arg Leu Ser Asn Leu Ile Glu Val Thr Ala Tyr Ile  
 65 70 75 80

Pro Gly Ile Gly His Asn Leu Gln Glu His Ser Val Val Leu Leu Arg  
 85 90 95

Gly Gly Arg Val Lys Asp Leu Pro Gly Val Arg Tyr His Ile Val Arg  
 100 105 110

Gly Ala Leu Asp Thr Ala Gly Val Asn Asp Arg Lys Gln Gly Arg Ser  
 115 120 125

Lys Tyr Gly Thr Lys Arg Pro Lys Ala  
 130 135

<210> 617  
 <211> 156  
 <212> PRT  
 <213> Streptococcus pneumoniae

<400> 617

Met Ser Arg Lys Asn Arg Ala Pro Lys Arg Asp Val Leu Pro Asp Pro  
 1 5 10 15

Leu Tyr Asn Ser Gln Leu Val Thr Arg Leu Ile Asn Arg Val Met Leu  
 20 25 30

Asp Gly Lys Arg Gly Thr Ala Ala Ser Ile Val Tyr Gly Ala Phe Glu  
 35 40 45

Gln Ile Lys Glu Ala Thr Gly Asn Asp Ala Leu Glu Val Phe Glu Thr  
 50 55 60

Ala Met Glu Asn Ile Met Pro Val Leu Glu Val Arg Ala Arg Arg Val  
 65 70 75 80

Gly Gly Ser Asn Tyr Gln Val Pro Val Lys Val Arg Pro Glu Arg Arg  
85 90 95

Thr Thr Leu Gly Leu Arg Trp Leu Val Thr Ile Ala Arg Leu Arg Gly  
100 105 110

Glu His Thr Met Gln Asp Arg Leu Ala Lys Glu Ile Leu Asp Ala Ala  
115 120 125

Asn Asn Thr Gly Ala Ala Val Lys Lys Arg Glu Asp Thr His Arg Met  
130 135 140

Ala Glu Ala Asn Arg Ala Phe Ala His Phe Arg Trp  
145 150 155

<210> 618  
<211> 303  
<212> PRT  
<213> Streptococcus pneumoniae

<400> 618

Met Thr Glu Lys Leu Gln Leu Thr Lys Ser Asp Arg Lys Lys Val Trp  
1 5 10 15

Trp Arg Ser Thr Phe Leu Gln Gly Ser Trp Asn Phe Glu Arg Met Gln  
20 25 30

Asn Leu Gly Trp Ala Tyr Thr Leu Ile Pro Ala Ile Lys Lys Leu Tyr  
35 40 45

Thr Lys Lys Glu Asp Gln Ile Ala Ala Leu Glu Arg His Leu Glu Phe  
50 55 60

Phe Asn Thr His Pro Tyr Val Ala Ala Pro Val Met Gly Val Thr Leu  
65 70 75 80

Ala Leu Glu Glu Glu Arg Ala Asn Gly Val Glu Ile Asp Asp Ala Ala  
85 90 95

Ile Gln Gly Val Lys Ile Gly Met Met Gly Pro Leu Ala Gly Ile Gly  
100 105 110

Asp Pro Val Phe Trp Phe Thr Val Arg Pro Ile Leu Gly Ser Leu Gly  
 115 120 125

Ala Ser Leu Ala Leu Thr Gly Asn Ile Leu Gly Pro Leu Leu Phe Phe  
 130 135 140

Val Ala Trp Asn Leu Ile Arg Met Ser Phe Leu Trp Tyr Val Gln Glu  
 145 150 155 160

Ile Gly Tyr Lys Ala Gly Ser Glu Ile Thr Lys Asp Met Ser Gly Gly  
 165 170 175

Ile Leu Gln Asp Ile Thr Lys Gly Ala Ser Ile Leu Gly Met Phe Ile  
 180 185 190

Leu Ala Val Leu Val Gln Arg Trp Val Asn Ile Lys Phe Ala Phe Asp  
 195 200 205

Val Ser Lys Val Gln Leu Asp Glu Lys Ala Tyr Ile His Trp Asp Lys  
 210 215 220

Leu Pro Glu Gly Ser Lys Gly Ile Gln Glu Ala Phe Ala Gln Val Gly  
 225 230 235 240

Gln Gly Leu Ser Gln Thr Pro Glu Lys Val Thr Thr Phe Gln Gln Asn  
 245 250 255

Leu Asp Met Leu Ile Pro Gly Leu Ser Gly Leu Leu Leu Thr Leu Leu  
 260 265 270

Cys Met Tyr Leu Leu Lys Lys Lys Val Ser Pro Ile Thr Ile Ile Leu  
 275 280 285

Ala Leu Phe Ala Val Gly Ile Val Ala His Val Leu His Ile Met  
 290 295 300

<210> 619

<211> 267

<212> PRT

<213> Streptococcus pneumoniae

<400> 619



Met Ser Ile Ile Ser Met Val Leu Val Val Val Val Ala Phe Phe Ala  
 1 5 10 15  
 Gly Leu Glu Gly Ile Leu Asp Gln Phe Gln Phe His Gln Pro Leu Val  
 20 25 30  
 Ala Cys Thr Leu Ile Gly Leu Val Thr Gly His Leu Glu Ala Gly Ile  
 35 40 45  
 Ile Leu Gly Gly Ser Leu Gln Met Ile Ala Leu Gly Trp Ser Asn Ile  
 50 55 60  
 Gly Ala Ala Ile Ala Pro Asp Ala Ala Leu Ala Ser Val Ala Ala Ala  
 65 70 75 80  
 Ile Ile Met Val Leu Gly Gly Asp Phe Thr Lys Thr Gly Ile Gly Val  
 85 90 95  
 Ala Gln Ala Val Ala Ile Pro Leu Ala Val Ala Gly Leu Phe Leu Thr  
 100 105 110  
 Met Ile Val Arg Thr Ile Ser Val Gly Leu Val His Thr Ala Asp Ala  
 115 120 125  
 Ala Ala Lys Lys Gly Asp Phe Gly Ala Val Glu Arg Ala His Phe Ile  
 130 135 140  
 Ala Leu Leu Phe Gln Gly Leu Arg Ile Ala Leu Pro Ala Ala Leu Leu  
 145 150 155 160  
 Leu Met Val Pro Thr Glu Thr Val Gln Ser Ile Leu Ser Ala Met Pro  
 165 170 175  
 Asp Trp Leu Lys Asp Gly Met Ala Ile Gly Gly Gly Met Val Val Ala  
 180 185 190  
 Val Gly Tyr Ala Met Val Ile Asn Met Met Ala Thr Arg Glu Val Trp  
 195 200 205  
 Pro Phe Phe Ala Leu Gly Phe Val Leu Ala Ala Val Ser Asp Ile Thr  
 210 215 220

Leu Ile Gly Phe Gly Ala Ile Gly Val Ala Ile Ala Leu Ile Tyr Leu  
 225 230 235 240

His Leu Ser Lys Thr Gly Gly Asn Gly Gly Gly Gly Ala Ala Thr Ser  
 245 250 255

Asn Asp Pro Ile Gly Asp Ile Leu Glu Asp Tyr  
 260 265

<210> 620

<211> 332

<212> PRT

<213> Streptococcus pneumoniae

<400> 620

Met Thr Ile Met Ser Ile Gly Ile Ile Ile Ala Ser His Gly Glu Phe  
 1 5 10 15

Ala Ala Gly Ile His Gln Ser Gly Ser Met Ile Phe Gly Glu Gln Glu  
 20 25 30

Lys Val Gln Val Val Thr Phe Met Pro Asn Glu Gly Pro Asp Asp Leu  
 35 40 45

Tyr Ala Lys Phe Asn Asn Ala Val Ala Ala Phe Asp Ala Glu Asp Glu  
 50 55 60

Val Leu Val Leu Ala Asp Leu Trp Ser Gly Ser Pro Phe Asn Gln Ala  
 65 70 75 80

Ser Arg Val Met Gly Glu Asn Pro Glu Arg Lys Phe Ala Ile Ile Thr  
 85 90 95

Gly Leu Asn Leu Pro Met Leu Ile Gln Ala Tyr Thr Glu Arg Leu Met  
 100 105 110

Asp Ala Ala Ala Gly Val Glu Lys Val Ala Ala Asn Ile Ile Lys Glu  
 115 120 125

Ala Lys Asp Gly Ile Lys Ala Leu Pro Glu Glu Leu Asn Pro Val Glu  
 130 135 140

Glu Val Ala Ser Ala Ala Ala Pro Val Ala Gln Thr Ala Ile Pro  
 145 150 155 160

Glu Gly Thr Val Ile Gly Asp Gly Lys Leu Lys Ile Asn Leu Ala Arg  
 165 170 175

Leu Asp Thr Arg Leu Leu His Gly Gln Val Ala Thr Ala Trp Thr Pro  
 180 185 190

Asp Ser Lys Ala Asn Arg Ile Ile Val Ala Ser Asp Asn Val Ala Lys  
 195 200 205

Asp Asp Leu Arg Lys Glu Leu Ile Lys Gln Ala Ala Pro Gly Asn Val  
 210 215 220

Lys Ala Asn Val Val Pro Ile Gln Lys Leu Ile Glu Ile Ser Lys Asp  
 225 230 235 240

Pro Arg Phe Gly Glu Thr His Ala Leu Ile Leu Phe Glu Thr Pro Gln  
 245 250 255

Asp Ala Leu Arg Ala Ile Glu Gly Gly Val Pro Ile Lys Thr Leu Asn  
 260 265 270

Val Gly Ser Met Ala His Ser Thr Gly Lys Thr Leu Val Asn Thr Val  
 275 280 285

Leu Ser Met Asp Lys Glu Asp Val Ala Thr Phe Glu Lys Met Arg Asp  
 290 295 300

Leu Gly Val Glu Phe Asp Val Arg Lys Val Pro Asn Asp Ser Lys Lys  
 305 310 315 320

Asp Leu Phe Asp Leu Ile Asn Lys Ala Asn Val Lys  
 325 330

<210> 621

<211> 339

<212> PRT

<213> Streptococcus pneumoniae

<400> 621

Met Lys Ala Val Val Val Asn Pro Glu Ser Thr Gly Val Ala Ile Glu  
 1 5 10 15  
 Glu Lys Val Leu Arg Pro Leu Glu Thr Gly Glu Ala Leu Val Glu Val  
 20 25 30  
 Glu Tyr Cys Gly Val Cys His Thr Asp Leu His Val Ala His Gly Asp  
 35 40 45  
 Phe Gly Gln Val Pro Gly Arg Val Leu Gly His Glu Gly Ile Gly Ile  
 50 55 60  
 Val Lys Glu Ile Ala Pro Asp Val Lys Ser Leu Lys Val Gly Asp Arg  
 65 70 75 80  
 Val Ser Val Ala Trp Phe Phe Glu Gly Cys Gly Thr Cys Glu Tyr Cys  
 85 90 95  
 Thr Thr Gly Arg Glu Thr Leu Cys Arg Thr Val Lys Asn Ala Gly Tyr  
 100 105 110  
 Ser Val Asp Gly Gly Met Ala Glu Gln Cys Ile Val Thr Ala Asp Tyr  
 115 120 125  
 Ala Val Lys Val Pro Asp Gly Leu Asp Pro Ala Gln Ala Ser Ser Ile  
 130 135 140  
 Thr Cys Ala Gly Val Thr Thr Tyr Lys Ala Ile Lys Glu Ala Lys Val  
 145 150 155 160  
 Glu Pro Gly Gln Trp Val Val Leu Tyr Gly Ala Gly Gly Leu Gly Asn  
 165 170 175  
 Leu Ala Val Gln Tyr Ala Lys Lys Val Phe Asn Ala His Val Ile Ala  
 180 185 190  
 Val Asp Ile Asn Asn Asp Lys Leu Ala Leu Ala Lys Glu Val Gly Ala  
 195 200 205  
 Asp Ile Val Ile Asn Gly Leu Glu Val Glu Asp Val Ala Gly Leu Ile  
 210 215 220

Lys Glu Lys Thr Asp Gly Gly Ala His Ser Ala Val Val Thr Ala Val  
 225 230 235 240

Ser Lys Val Ala Phe Asn Gln Ala Val Asp Ser Ile Arg Ala Gly Gly  
 245 250 255

Arg Val Val Ala Val Gly Leu Pro Ser Glu Met Met Glu Leu Ser Ile  
 260 265 270

Val Lys Thr Val Leu Asp Gly Ile Gln Val Ile Gly Ser Leu Val Gly  
 275 280 285

Thr Arg Lys Asp Leu Glu Glu Ala Phe Gln Phe Gly Ala Glu Gly Leu  
 290 295 300

Val Val Pro Val Val Gln Lys Arg Pro Val Glu Asp Ala Val Ala Ile  
 305 310 315 320

Phe Asp Glu Met Glu Lys Gly Gln Ile Gln Gly Arg Met Val Leu Asp  
 325 330 335

Phe Thr His

<210> 622

<211> 148

<212> PRT

<213> Streptococcus pneumoniae

<400> 622

Met Asn Lys Thr Thr Phe Met Ala Lys Pro Gly Gln Val Glu Arg Lys  
 1 5 10 15

Trp Tyr Val Val Asp Ala Thr Asp Val Pro Leu Gly Arg Leu Ser Ala  
 20 25 30

Val Val Ala Ser Val Leu Arg Gly Lys Asn Lys Pro Thr Phe Thr Pro  
 35 40 45

His Thr Asp Thr Gly Asp Phe Val Ile Val Ile Asn Ala Glu Lys Val  
 50 55 60

Lys Leu Thr Gly Lys Lys Ala Thr Asp Lys Ile Tyr Tyr Thr His Ser  
65 70 75 80

Asn His Pro Gly Gly Leu Lys Gln Ile Ser Ala Gly Glu Leu Arg Ser  
85 90 95

Lys Asn Ala Val Arg Leu Ile Glu Lys Ser Val Lys Gly Met Leu Pro  
100 105 110

His Asn Thr Leu Gly Arg Ala Gln Gly Met Lys Leu Lys Val Phe Val  
115 120 125

Gly Ala Glu His Thr His Ala Ala Gln Gln Pro Glu Val Leu Asp Ile  
130 135 140

Ser Gly Leu Ile  
145

<210> 623  
<211> 130  
<212> PRT  
<213> Streptococcus pneumoniae

<400> 623

Met Ser Gln Ala Gln Tyr Ala Gly Thr Gly Arg Arg Lys Asn Ala Val  
1 5 10 15

Ala Arg Val Arg Leu Val Pro Gly Thr Gly Lys Ile Thr Val Asn Lys  
20 25 30

Lys Asp Val Glu Glu Tyr Ile Pro His Ala Asp Leu Arg Leu Val Ile  
35 40 45

Asn Gln Pro Phe Ala Val Thr Ser Thr Val Gly Ser Tyr Asp Val Phe  
50 55 60

Val Asn Val Ile Gly Gly Gly Tyr Ala Gly Gln Ser Gly Ala Ile Arg  
65 70 75 80

His Gly Ile Ala Arg Ala Leu Leu Gln Val Asp Pro Asp Phe Arg Asp  
85 90 95

Ser Leu Lys Arg Ala Gly Leu Leu Thr Arg Asp Ser Arg Lys Val Glu  
 100 105 110

Arg Lys Lys Pro Gly Leu Lys Lys Ala Arg Lys Ala Ser Gln Phe Ser  
 115 120 125

Lys Arg  
 130

<210> 624  
 <211> 272  
 <212> PRT  
 <213> Streptococcus pneumoniae

<400> 624

Met Thr Gly Ser Asn Lys Leu Thr Lys Arg Asp Tyr Leu Lys Thr Ser  
 1 5 10 15

Leu Arg Ala Phe Phe Cys Gln Asn Gly Phe Asn Tyr Ser Asn Tyr Gln  
 20 25 30

Gly Leu Gly Tyr Ala Asn Val Met Tyr Pro Ala Leu Lys Lys His Tyr  
 35 40 45

Gly Glu Asp Gln Glu Gly Phe Tyr Gln Ala Leu Glu Glu Asn Cys Glu  
 50 55 60

Phe Tyr Asn Thr Asn Pro His Phe Leu Pro Phe Ile Thr Ser Leu His  
 65 70 75 80

Leu Val Met Leu Glu Asn Gly Arg Pro Ala Lys Glu Thr Arg Ser Ile  
 85 90 95

Lys Met Ala Leu Met Gly Pro Leu Ala Gly Ile Gly Asp Ser Leu Ser  
 100 105 110

Gln Phe Cys Leu Ala Pro Leu Phe Ser Thr Ile Ala Ala Ser Phe Ala  
 115 120 125

Gln Glu Gly Leu Val Val Gly Pro Ile Leu Phe Phe Leu Ala Met Asn  
 130 135 140

Thr Ile Leu Thr Ala Ile Lys Leu Ser Thr Gly Leu Tyr Gly Tyr Lys  
145 150 155 160

Leu Gly Thr Thr Val Ile Asp Lys Leu Ser Glu Gln Met Ala Thr Ile  
165 170 175

Ser Arg Ile Ala Asn Ile Ile Gly Val Thr Val Ile Ala Gly Leu Ala  
180 185 190

Ala Thr Ser Val Lys Ile Met Val Pro Ile Thr Phe Ala Ala Gly Glu  
195 200 205

Val Lys Ala Asp Ala Lys Gln Ser Ile Val Ser Ile Gln Gly Met Leu  
210 215 220

Asp Lys Val Ala Pro Ala Leu Leu Pro Ala Leu Phe Thr Leu Leu Val  
225 230 235 240

Tyr Tyr Leu Ile Lys Glu Lys Lys Trp Thr Thr Tyr Lys Leu Val Ile  
245 250 255

Leu Thr Val Ile Ile Gly Ile Ile Gly Ser Trp Leu Lys Ile Ile Ala  
260 265 270

<210> 625

<211> 494

<212> PRT

<213> Streptococcus pneumoniae

<400> 625

Met Lys Lys Gln Ala Phe Ser Ser Glu Gln Tyr Leu Asn Leu Gln Arg  
1 5 10 15

Asp His Ile Leu Glu Arg Ile Asn Gln Phe Asp Gly Lys Leu Tyr Leu  
20 25 30

Glu Phe Gly Gly Lys Met Leu Glu Asp Phe His Ala Ala Arg Val Leu  
35 40 45

Pro Gly Tyr Glu Pro Asp Asn Lys Ile Lys Leu Leu Gln Glu Leu Lys  
50 55 60



Glu Gln Val Glu Val Val Ile Ala Ile Asn Ala Ser Asn Ile Glu His  
 65 70 75 80

Ser Lys Ala Arg Gly Asp Leu Gly Ile Ser Tyr Asp Gln Glu Val Leu  
 85 90 95

Arg Leu Ile Asp Lys Phe Asn Glu Leu Gly Ile Phe Val Gly Ser Val  
 100 105 110

Val Ile Thr Gln Tyr Ala Gly Gln Pro Ala Ala Asp Ala Phe Arg Asn  
 115 120 125

Gln Leu Glu Lys Asn Gly Ile Asp Ser Tyr Leu His Tyr Pro Ile Lys  
 130 135 140

Gly Tyr Pro Thr Asp Met Asp His Ile Ile Ser Pro Glu Gly Met Gly  
 145 150 155 160

Lys Asn Asp Tyr Ile Lys Thr Ser Arg Asn Leu Ile Val Val Thr Ala  
 165 170 175

Pro Gly Pro Gly Ser Gly Lys Leu Ala Thr Cys Met Ser Asn Met Tyr  
 180 185 190

His Asp Gln Ile Asn Gly Ile Lys Ser Gly Tyr Ala Lys Phe Glu Thr  
 195 200 205

Phe Pro Val Trp Asn Leu Pro Leu His His Pro Val Asn Leu Ala Tyr  
 210 215 220

Glu Ala Ala Thr Ala Asp Leu Asp Asp Val Asn Met Ile Asp Pro Phe  
 225 230 235 240

His Leu Gln Thr Tyr Gly Glu Thr Thr Val Asn Tyr Asn Arg Asp Ile  
 245 250 255

Glu Ile Phe Pro Val Leu Lys Arg Met Leu Glu Arg Ile Leu Gly Lys  
 260 265 270

Ser Pro Tyr Ala Ser Pro Thr Asp Met Gly Val Asn Met Val Gly Phe

275	280	285
Ala Ile Thr Asp Asp Glu	Ala Ala Val Glu Ala	Ser Lys Gln Glu Ile
290	295	300
Ile Arg Arg Tyr Tyr Gln Thr Val Leu Asp Phe Lys Ala Glu Lys Val		
305	310	315 320
Gly Glu Ala Ala Val Lys Lys Ile Glu Leu Leu Met Asn Asp Leu Gly		
	325	330 335
Ile Thr Pro Ala Asp Arg Lys Val Ala Val Val Ala Arg Gln Lys Ala		
	340	345 350
Glu Glu Thr Gly Gly Pro Ala Leu Ala Phe Glu Leu Pro Asn Gly Glu		
	355	360 365
Ile Ile Thr Gly Lys Asn Ser Glu Leu Phe Gly Pro Thr Ala Ala Ala		
	370	375 380
Leu Ile Asn Ala Ile Lys Lys Ser Ala Asp Ile Ala Lys Glu Val Lys		
	385	390 395 400
Leu Ile Glu Pro Glu Val Val Lys Pro Ile Gln Gly Leu Lys Ile Asp		
	405	410 415
His Leu Gly Ser Arg Asn Pro Arg Leu His Ser Asn Glu Ile Leu Ile		
	420	425 430
Ala Leu Ala Ile Thr Ala Thr Glu Asn Pro Asp Ala Ala Arg Ala Met		
	435	440 445
Glu Glu Leu Gly Asn Leu Lys Gly Ser Glu Ala His Ser Thr Ile Ile		
	450	455 460
Leu Thr Asp Glu Asp Lys Asn Val Leu Arg Lys Leu Gly Ile Asn Val		
	465	470 475 480
Thr Phe Asp Pro Tyr Tyr Gln Tyr Asp Arg Leu Tyr Arg Lys		
	485	490

<210> 626  
 <211> 719  
 <212> PRT  
 <213> Streptococcus pneumoniae

<400> 626

Met Asn Lys Pro Thr Ile Leu Arg Leu Ile Lys Tyr Leu Ser Ile Ser  
 1 5 10 15

Phe Leu Ser Leu Val Ile Ala Ala Ile Val Leu Gly Gly Gly Val Phe  
 20 25 30

Phe Tyr Tyr Val Ser Lys Ala Pro Ser Leu Ser Glu Ser Lys Leu Val  
 35 40 45

Ala Thr Thr Ser Ser Lys Ile Tyr Asp Asn Lys Asn Gln Leu Ile Ala  
 50 55 60

Asp Leu Gly Ser Glu Arg Arg Val Asn Ala Gln Ala Asn Asp Ile Pro  
 65 70 75 80

Thr Asp Leu Val Lys Ala Ile Val Ser Ile Glu Asp His Arg Phe Phe  
 85 90 95

Asp His Arg Gly Ile Asp Thr Ile Arg Ile Leu Gly Ala Phe Leu Arg  
 100 105 110

Asn Leu Gln Ser Asn Ser Leu Gln Gly Gly Ser Thr Leu Thr Gln Gln  
 115 120 125

Leu Ile Lys Leu Thr Tyr Phe Ser Thr Ser Thr Ser Asp Gln Thr Ile  
 130 135 140

Ser Arg Lys Ala Gln Glu Ala Trp Leu Ala Ile Gln Leu Glu Gln Lys  
 145 150 155 160

Ala Thr Lys Gln Glu Ile Leu Thr Tyr Tyr Ile Asn Lys Val Tyr Met  
 165 170 175

Ser Asn Gly Asn Tyr Gly Met Gln Thr Ala Ala Gln Asn Tyr Tyr Gly  
 180 185 190

Lys Asp Leu Asn Asn Leu Ser Leu Pro Gln Leu Ala Leu Leu Ala Gly  
 195 200 205

Met Pro Gln Ala Pro Asn Gln Tyr Asp Pro Tyr Ser His Pro Glu Ala  
 210 215 220

Ala Gln Asp Arg Arg Asn Leu Val Leu Ser Glu Met Lys Asn Gln Gly  
 225 230 235 240

Tyr Ile Ser Ala Glu Gln Tyr Glu Lys Ala Val Asn Thr Pro Ile Thr  
 245 250 255

Asp Gly Leu Gln Ser Leu Lys Ser Ala Ser Asn Tyr Pro Ala Tyr Met  
 260 265 270

Asp Asn Tyr Leu Lys Glu Val Ile Asn Gln Val Glu Glu Glu Thr Gly  
 275 280 285

Tyr Asn Leu Leu Thr Thr Gly Met Asp Val Tyr Thr Asn Val Asp Gln  
 290 295 300

Glu Ala Gln Lys His Leu Trp Asp Ile Tyr Asn Thr Asp Glu Tyr Val  
 305 310 315 320

Ala Tyr Pro Asp Asp Glu Leu Gln Val Ala Ser Thr Ile Val Asp Val  
 325 330 335

Ser Asn Gly Lys Val Ile Ala Gln Leu Gly Ala Arg His Gln Ser Ser  
 340 345 350

Asn Val Ser Phe Gly Ile Asn Gln Ala Val Glu Thr Asn Arg Asp Trp  
 355 360 365

Gly Ser Thr Met Lys Pro Ile Thr Asp Tyr Ala Pro Ala Leu Glu Tyr  
 370 375 380

Gly Val Tyr Asp Ser Thr Ala Thr Ile Val His Asp Glu Pro Tyr Asn  
 385 390 395 400

Tyr Pro Gly Thr Asn Thr Pro Val Tyr Asn Trp Asp Arg Gly Tyr Phe  
 405 410 415

Gly Asn Ile Thr Leu Gln Tyr Ala Leu Gln Gln Ser Arg Asn Val Pro  
 420 425 430

Ala Val Glu Thr Leu Asn Lys Val Gly Leu Asn Arg Ala Lys Thr Phe  
 435 440 445

Leu Asn Gly Leu Gly Ile Asp Tyr Pro Ser Ile His Tyr Ser Asn Ala  
 450 455 460

Ile Ser Ser Asn Thr Thr Glu Ser Asp Lys Lys Tyr Gly Ala Ser Ser  
 465 470 475 480

Glu Lys Met Ala Ala Ala Tyr Ala Ala Phe Ala Asn Gly Gly Thr Tyr  
 485 490 495

Tyr Lys Pro Met Tyr Ile His Lys Val Val Phe Ser Asp Gly Ser Glu  
 500 505 510

Lys Glu Phe Ser Asn Val Gly Thr Arg Ala Met Lys Glu Thr Thr Ala  
 515 520 525

Tyr Met Met Thr Asp Met Met Lys Thr Val Leu Thr Tyr Gly Thr Gly  
 530 535 540

Arg Asn Ala Tyr Leu Ala Trp Leu Pro Gln Ala Gly Lys Thr Gly Thr  
 545 550 555 560

Ser Asn Tyr Thr Asp Glu Glu Ile Glu Asn His Ile Lys Thr Ser Gln  
 565 570 575

Phe Val Ala Pro Asp Glu Leu Phe Ala Gly Tyr Thr Arg Lys Tyr Ser  
 580 585 590

Met Ala Val Trp Thr Gly Tyr Ser Asn Arg Leu Thr Pro Leu Val Gly  
 595 600 605

Asn Gly Leu Thr Val Ala Ala Lys Val Tyr Arg Ser Met Met Thr Tyr  
 610 615 620

Leu Ser Glu Gly Ser Asn Pro Glu Asp Trp Asn Ile Pro Glu Gly Leu  
 625 630 635 640

Tyr Arg Asn Gly Glu Phe Val Phe Lys Asn Gly Ala Arg Ser Thr Trp  
 645 650 655

Asn Ser Pro Ala Pro Gln Gln Pro Pro Ser Thr Glu Ser Ser Ser Ser  
 660 665 670

Ser Ser Asp Ser Ser Thr Ser Gln Ser Ser Ser Thr Thr Pro Ser Thr  
 675 680 685

Asn Asn Ser Thr Thr Thr Asn Pro Asn Asn Asn Thr Gln Gln Ser Asn  
 690 695 700

Thr Thr Pro Asp Gln Gln Asn Gln Asn Pro Gln Pro Ala Gln Pro  
 705 710 715

<210> 627

<211> 113

<212> PRT

<213> Streptococcus pneumoniae

<400> 627

Met Glu Arg Asp Met Ala Ser Ile Ile Phe Ser Ala Lys Asp Ile Phe  
 1 5 10 15

Glu Gln Glu Phe Gly Arg Glu Val Arg Gly Tyr Asn Lys Val Glu Val  
 20 25 30

Asp Glu Phe Leu Asp Asp Val Ile Lys Asp Tyr Glu Thr Tyr Ala Ala  
 35 40 45

Leu Val Lys Ser Leu Arg Gln Glu Ile Ala Asp Leu Lys Glu Glu Leu  
 50 55 60

Thr Arg Lys Pro Lys Pro Ser Pro Val Gln Ala Glu Pro Leu Glu Ala  
 65 70 75 80

Ala Ile Thr Ser Ser Met Thr Asn Phe Asp Ile Leu Lys Arg Leu Asn  
 85 90 95

Arg Leu Glu Lys Glu Val Phe Gly Lys Gln Ile Leu Asp Asn Ser Asp  
 100 105 110

Phe

&lt;210&gt; 628

&lt;211&gt; 464

&lt;212&gt; PRT

&lt;213&gt; Streptococcus pneumoniae

&lt;400&gt; 628

Met Ser Lys Lys Arg Arg Asn Arg His Lys Lys Glu Gly Gln Glu Pro  
 1 5 10 15

Gln Phe Asp Phe Asp Glu Ala Lys Glu Leu Thr Val Gly Gln Ala Ile  
 20 25 30

Arg Lys Asn Glu Glu Val Glu Ser Gly Val Leu Pro Glu Asp Ser Ile  
 35 40 45

Leu Asp Lys Tyr Val Lys Gln His Arg Asp Glu Ile Glu Ala Asp Lys  
 50 55 60

Phe Ala Thr Arg Gln Tyr Lys Lys Glu Glu Phe Val Glu Thr Gln Ser  
 65 70 75 80

Leu Asp Asp Leu Ile Gln Glu Met Arg Glu Ala Val Glu Lys Ser Glu  
 85 90 95

Ala Ser Ser Glu Glu Val Pro Ser Ser Glu Asp Ile Leu Leu Pro Leu  
 100 105 110

Pro Leu Asp Asp Glu Glu Gln Gly Leu Asp Pro Leu Leu Leu Asp Asp  
 115 120 125

Glu Asn Pro Thr Glu Met Thr Glu Glu Val Glu Glu Glu Gln Asn Leu  
 130 135 140

Ser Arg Leu Asp Gln Glu Asp Ser Glu Lys Lys Ser Lys Lys Gly Phe  
 145 150 155 160

Ile Leu Thr Val Leu Ala Leu Val Ser Val Ile Ile Cys Val Ser Ala  
 165 170 175

Tyr Tyr Val Tyr Arg Gln Val Ala Arg Ser Thr Lys Glu Ile Glu Thr  
 180 185 190  
 Ser Gln Ser Thr Thr Ala Asn Gln Ser Asp Val Asp Asp Phe Asn Thr  
 195 200 205  
 Leu Tyr Asp Ala Phe Tyr Thr Asp Ser Asn Lys Thr Ala Leu Lys Asn  
 210 215 220  
 Ser Gln Phe Asp Lys Leu Ser Gln Leu Lys Thr Leu Leu Asp Lys Leu  
 225 230 235 240  
 Glu Gly Ser Arg Glu His Thr Leu Ala Lys Ser Lys Tyr Asp Ser Leu  
 245 250 255  
 Ala Thr Gln Ile Lys Ala Ile Gln Asp Val Asn Ala Gln Phe Glu Lys  
 260 265 270  
 Pro Ala Ile Val Asp Gly Val Leu Asp Thr Asn Ala Lys Ala Lys Ser  
 275 280 285  
 Asp Ala Lys Phe Thr Asp Ile Lys Thr Gly Asn Thr Glu Leu Asp Lys  
 290 295 300  
 Val Leu Asp Lys Ala Ile Ser Leu Gly Lys Ser Gln Gln Thr Ser Thr  
 305 310 315 320  
 Ser Ser Ser Ser Ser Ser Gln Thr Ser Ser Ser Ser Ser Ser Gln Ala  
 325 330 335  
 Ser Ser Asn Thr Thr Ser Glu Pro Lys Pro Ser Ser Ser Asn Glu Thr  
 340 345 350  
 Arg Ser Ser Arg Ser Glu Val Asn Met Gly Leu Ser Ser Ala Gly Val  
 355 360 365  
 Ala Val Gln Arg Ser Ala Ser Arg Val Ala Tyr Asn Gln Ser Ala Ile  
 370 375 380  
 Asp Asp Ser Asn Asn Ser Ala Trp Asp Phe Ala Asp Gly Val Leu Glu



385                                      390                                      395                                      400  
 Gln Ile Leu Ala Thr Ser Arg Ser Arg Gly Tyr Ile Thr Gly Asp Gln  
    405                                      410                                      415  
 Tyr Ile Leu Glu Arg Val Asn Ile Val Asn Gly Asn Gly Tyr Tyr Asn  
    420                                      425                                      430  
 Leu Tyr Lys Pro Asp Gly Thr Tyr Leu Phe Thr Leu Asn Cys Lys Thr  
    435                                      440                                      445  
 Gly Tyr Phe Val Gly Asn Gly Ala Gly His Ala Asp Asp Leu Asp Tyr  
    450                                      455                                      460  
  
 <210> 629  
 <211> 481  
 <212> PRT  
 <213> Streptococcus pneumoniae  
  
 <400> 629  
 Met Lys Gln Glu Glu Cys Gln Met Thr Lys Ala Asn Phe Gly Val Val  
 1                                      5                                      10                                      15  
  
 Gly Met Ala Val Met Gly Arg Asn Leu Ala Leu Asn Ile Glu Ser Arg  
    20                                      25                                      30  
  
 Gly Tyr Thr Val Ala Ile Tyr Asn Arg Ser Lys Glu Lys Thr Glu Asp  
    35                                      40                                      45  
  
 Val Ile Ala Cys His Pro Glu Lys Asn Phe Val Pro Ser Tyr Asp Val  
    50                                      55                                      60  
  
 Glu Ser Phe Val Asn Ser Ile Glu Lys Pro Arg Arg Ile Met Leu Met  
 65                                      70                                      75                                      80  
  
 Val Gln Ala Gly Pro Gly Thr Asp Ala Thr Ile Gln Ala Leu Leu Pro  
    85                                      90                                      95  
  
 His Leu Asp Lys Gly Asp Ile Leu Ile Asp Gly Gly Asn Thr Phe Tyr  
    100                                      105                                      110  
  
 Lys Asp Thr Ile Arg Arg Asn Glu Glu Leu Ala Asn Ser Gly Ile Asn

115	120	125													
Phe	Ile	Gly	Thr	Gly	Val	Ser	Gly	Gly	Glu	Lys	Gly	Ala	Leu	Glu	Gly
130						135					140				
Pro	Ser	Ile	Met	Pro	Gly	Gly	Gln	Lys	Glu	Ala	Tyr	Glu	Leu	Val	Ala
145					150					155					160
Asp	Val	Leu	Glu	Glu	Ile	Ser	Ala	Lys	Ala	Pro	Glu	Asp	Gly	Lys	Pro
				165					170					175	
Cys	Val	Thr	Tyr	Ile	Gly	Pro	Asp	Gly	Ala	Gly	His	Tyr	Val	Lys	Met
			180					185						190	
Val	His	Asn	Gly	Ile	Glu	Tyr	Gly	Asp	Met	Gln	Leu	Ile	Ala	Glu	Ser
		195					200					205			
Tyr	Asp	Leu	Met	Gln	His	Leu	Leu	Gly	Leu	Ser	Ala	Glu	Asp	Met	Ala
	210					215					220				
Glu	Ile	Phe	Thr	Glu	Trp	Asn	Lys	Gly	Glu	Leu	Asp	Ser	Tyr	Leu	Ile
225					230					235					240
Glu	Ile	Thr	Ala	Asp	Ile	Leu	Ser	Arg	Lys	Asp	Asp	Glu	Gly	Gln	Asp
				245					250					255	
Gly	Pro	Ile	Val	Asp	Tyr	Ile	Leu	Asp	Ala	Ala	Gly	Asn	Lys	Gly	Thr
			260					265						270	
Gly	Lys	Trp	Thr	Ser	Gln	Ser	Ser	Leu	Asp	Leu	Gly	Val	Pro	Leu	Ser
		275					280					285			
Leu	Ile	Thr	Glu	Ser	Val	Phe	Ala	Arg	Tyr	Ile	Ser	Thr	Tyr	Lys	Glu
	290					295					300				
Glu	Arg	Val	His	Ala	Ser	Lys	Val	Leu	Pro	Lys	Pro	Ala	Ala	Phe	Asn
305					310					315					320
Phe	Glu	Gly	Asp	Lys	Ala	Glu	Leu	Ile	Glu	Lys	Ile	Arg	Gln	Ala	Leu
				325					330					335	

Tyr Phe Ser Lys Ile Ile Ser Tyr Ala Gln Gly Phe Ala Gln Leu Arg  
 340 345 350

Val Ala Ser Lys Glu Asn Asn Trp Asn Leu Pro Phe Ala Asp Ile Ala  
 355 360 365

Ser Ile Trp Arg Asp Gly Cys Ile Ile Arg Ser Arg Phe Leu Gln Lys  
 370 375 380

Ile Thr Asp Ala Tyr Asn Arg Asp Ala Asp Leu Ala Asn Leu Leu Leu  
 385 390 395 400

Asp Glu Tyr Phe Leu Asp Val Thr Ala Lys Tyr Gln Gln Ala Val Arg  
 405 410 415

Asp Ile Val Ala Leu Ala Val Gln Ala Gly Val Pro Val Pro Thr Phe  
 420 425 430

Ser Ala Ala Ile Thr Tyr Phe Asp Ser Tyr Arg Ser Ala Asp Leu Pro  
 435 440 445

Ala Asn Leu Ile Gln Ala Gln Arg Asp Tyr Phe Gly Ala His Thr Tyr  
 450 455 460

Gln Arg Lys Asp Lys Glu Gly Thr Phe His Tyr Ser Trp Tyr Asp Glu  
 465 470 475 480

Lys

<210> 630

<211> 144

<212> PRT

<213> Streptococcus pneumoniae

<400> 630

Met Asp Tyr Gln Arg Ile Asn Glu Tyr Leu Thr Ser Ile Phe Asn Asn  
 1 5 10 15

Val Leu Val Ile Glu Glu Val Asn Leu Arg Gly Ser Arg Phe Lys Asp  
 20 25 30

Ile Ser Ile Lys Glu Met His Thr Ile Asp Val Ile Gly Lys Ala Pro  
 35 40 45

Asp Val Thr Pro Ser Gln Val Ser Lys Glu Leu Met Val Thr Leu Gly  
 50 55 60

Thr Val Thr Thr Ser Leu Asn Asn Leu Glu Arg Lys Gly Tyr Ile Glu  
 65 70 75 80

Arg Val Arg Ser Glu Gln Asp Arg Arg Val Val His Leu His Leu Thr  
 85 90 95

Lys Lys Gly Arg Leu Ile His Arg Leu His Lys Arg Phe His Lys Ala  
 100 105 110

Met Val Glu Lys Ile Ile Asp Gly Met Ser Glu Glu Glu Ile Ala Val  
 115 120 125

Met Gly Lys Gly Leu Thr Asn Leu Tyr Gln Phe Leu Glu Asp Leu Lys  
 130 135 140

<210> 631

<211> 74

<212> PRT

<213> Streptococcus pneumoniae

<400> 631

Met Ala Val Phe Glu Lys Val Gln Glu Ile Ile Val Glu Glu Leu Gly  
 1 5 10 15

Lys Asp Ala Ser Glu Val Thr Leu Glu Ser Thr Phe Asp Asp Leu Asp  
 20 25 30

Ala Asp Ser Leu Asp Leu Phe Gln Val Ile Ser Glu Ile Glu Asp Ala  
 35 40 45

Phe Asp Ile Gln Ile Glu Ala Glu Asn Asp Leu Lys Thr Val Gly Asp  
 50 55 60

Leu Val Ala Tyr Val Glu Glu Gln Ala Lys  
 65 70

<210> 632  
 <211> 774  
 <212> PRT  
 <213> Streptococcus pneumoniae

<400> 632

Met Val Val Lys Thr Val Val Glu Ala Gln Asp Ile Phe Asp Lys Ala  
 1 5 10 15

Trp Glu Gly Phe Lys Gly Val Asp Trp Lys Glu Lys Ala Ser Val Ser  
 20 25 30

Arg Phe Val Gln Ala Asn Tyr Thr Pro Tyr Asp Gly Asp Glu Ser Phe  
 35 40 45

Leu Ala Gly Pro Thr Glu Arg Ser Leu His Ile Lys Lys Ile Val Glu  
 50 55 60

Glu Thr Lys Ala His Tyr Glu Glu Thr Arg Phe Pro Met Asp Thr Arg  
 65 70 75 80

Pro Thr Ser Ile Ala Asp Ile Pro Ala Gly Phe Ile Asp Lys Glu Asn  
 85 90 95

Glu Val Ile Phe Gly Ile Gln Asn Asp Glu Leu Phe Lys Leu Asn Phe  
 100 105 110

Met Pro Lys Gly Gly Ile Arg Met Ala Glu Thr Thr Leu Lys Glu Asn  
 115 120 125

Gly Tyr Glu Pro Asp Pro Ala Val His Glu Ile Phe Thr Lys Tyr Val  
 130 135 140

Thr Thr Val Asn Asp Gly Ile Phe Arg Ala Tyr Thr Ser Asn Ile Arg  
 145 150 155 160

Arg Ala Arg His Ala His Thr Val Thr Gly Leu Pro Asp Ala Tyr Ser  
 165 170 175

Arg Gly Arg Ile Ile Gly Val Tyr Ala Arg Leu Ala Leu Tyr Gly Ala  
 180 185 190

Asp Tyr Leu Met Gln Glu Lys Val Asn Asp Trp Asn Ala Ile Lys Glu  
 195 200 205

Ile Asp Glu Glu Thr Ile Arg Leu Arg Glu Glu Val Asn Leu Gln Tyr  
 210 215 220

Gln Ala Leu Gln Gln Val Val Arg Leu Gly Asp Leu Tyr Gly Val Asp  
 225 230 235 240

Val Arg Lys Pro Ala Met Asn Val Lys Glu Ala Ile Gln Trp Val Asn  
 245 250 255

Ile Ala Phe Met Ala Val Cys Arg Val Ile Asn Gly Ala Ala Thr Ser  
 260 265 270

Leu Gly Arg Val Pro Ile Val Leu Asp Ile Phe Ala Glu Arg Asp Leu  
 275 280 285

Ala Arg Gly Thr Phe Thr Glu Ser Glu Ile Gln Glu Phe Val Asp Asp  
 290 295 300

Phe Val Met Lys Leu Arg Thr Val Lys Phe Ala Arg Thr Lys Ala Tyr  
 305 310 315 320

Asp Gln Leu Tyr Ser Gly Asp Pro Thr Phe Ile Thr Thr Ser Met Ala  
 325 330 335

Gly Met Gly Asn Asp Gly Arg His Arg Val Thr Lys Met Asp Tyr Arg  
 340 345 350

Phe Leu Asn Thr Leu Asp Asn Ile Gly Asn Ser Pro Glu Pro Asn Leu  
 355 360 365

Thr Val Leu Trp Thr Asp Lys Leu Pro Tyr Asn Phe Arg Arg Tyr Cys  
 370 375 380

Met His Met Ser His Lys His Ser Ser Ile Gln Tyr Glu Gly Val Thr  
 385 390 395 400

Thr Met Ala Lys Asp Gly Tyr Gly Glu Met Ser Cys Ile Ser Cys Cys  
 405 410 415

Val Ser Pro Leu Asp Pro Glu Asn Glu Glu Gln Arg His Asn Ile Gln  
 420 425 430

Tyr Phe Gly Ala Arg Val Asn Val Leu Lys Ala Leu Leu Thr Gly Leu  
 435 440 445

Asn Gly Gly Tyr Asp Asp Val His Lys Asp Tyr Lys Val Phe Asp Ile  
 450 455 460

Glu Pro Ile Arg Asp Glu Val Leu Glu Phe Glu Ser Val Lys Ala Asn  
 465 470 475 480

Phe Glu Lys Ser Leu Asp Trp Leu Thr Asp Thr Tyr Val Asp Ala Leu  
 485 490 495

Asn Ile Ile His Tyr Met Thr Asp Arg Tyr Asn Tyr Glu Ala Val Gln  
 500 505 510

Met Ala Phe Leu Pro Thr Lys Gln Arg Ala Asn Met Gly Phe Gly Ile  
 515 520 525

Cys Gly Phe Ala Asn Thr Val Asp Thr Leu Ser Ala Ile Lys Tyr Ala  
 530 535 540

Thr Val Lys Pro Ile Arg Asp Glu Asp Gly Tyr Ile Tyr Asp Tyr Glu  
 545 550 555 560

Thr Ile Gly Asp Tyr Pro Arg Trp Gly Glu Asp Asp Pro Arg Ser Asn  
 565 570 575

Glu Leu Ala Glu Trp Leu Ile Glu Ala Tyr Thr Thr Arg Leu Arg Ser  
 580 585 590

His Lys Leu Tyr Lys Asp Ala Glu Ala Thr Val Ser Leu Leu Thr Ile  
 595 600 605

Thr Ser Asn Val Ala Tyr Ser Lys Gln Thr Gly Asn Ser Pro Val His  
 610 615 620

Lys Gly Val Tyr Leu Asn Glu Asp Gly Ser Val Asn Leu Ser Lys Leu  
 625 630 635 640

Glu Phe Phe Ser Pro Gly Ala Asn Pro Ser Asn Lys Ala Lys Gly Gly  
645 650 655

Trp Leu Gln Asn Leu Asn Ser Leu Ser Ser Leu Asp Phe Ser Tyr Ala  
660 665 670

Ala Asp Gly Ile Ser Leu Thr Thr Gln Val Ser Pro Arg Ala Leu Gly  
675 680 685

Lys Thr Arg Asp Glu Gln Val Asp Asn Leu Val Thr Ile Leu Asp Gly  
690 695 700

Tyr Phe Glu Asn Gly Gly Gln His Val Asn Leu Asn Val Met Asp Leu  
705 710 715 720

Asn Asp Val Tyr Glu Lys Ile Met Ser Gly Glu Asp Val Ile Val Arg  
725 730 735

Ile Ser Gly Tyr Cys Val Asn Thr Lys Tyr Leu Thr Pro Glu Gln Lys  
740 745 750

Thr Glu Leu Thr Gln Arg Val Phe His Glu Val Leu Ser Met Asp Asp  
755 760 765

Ala Leu Asp Ala Leu Ser  
770

<210> 633

<211> 535

<212> PRT

<213> Streptococcus pneumoniae

<400> 633

Met Ser Thr Lys Tyr Ile Phe Val Thr Gly Gly Val Val Ser Ser Ile  
1 5 10 15

Gly Lys Gly Ile Val Ala Ala Ser Leu Gly Arg Leu Leu Lys Asn Arg  
20 25 30

Gly Leu Lys Val Thr Ile Gln Lys Phe Asp Pro Tyr Ile Asn Ile Asp  
35 40 45



Pro Gly Thr Met Ser Pro Tyr Gln His Gly Glu Val Phe Val Thr Asp  
 50 55 60

Asp Gly Ala Glu Thr Asp Leu Asp Leu Gly His Tyr Glu Arg Phe Ile  
 65 70 75 80

Asp Ile Asn Leu Asn Lys Tyr Ser Asn Val Thr Thr Gly Lys Ile Tyr  
 85 90 95

Ser Glu Val Leu Arg Lys Glu Arg Arg Gly Glu Tyr Leu Gly Ala Thr  
 100 105 110

Val Gln Val Ile Pro His Ile Thr Asp Ala Leu Lys Glu Lys Ile Lys  
 115 120 125

Arg Ala Ala Leu Thr Thr Asp Ser Asp Val Ile Ile Thr Glu Val Gly  
 130 135 140

Gly Thr Val Gly Asp Ile Glu Ser Leu Pro Phe Leu Glu Ala Leu Arg  
 145 150 155 160

Gln Met Lys Ala Asp Val Gly Ala Asp Asn Val Met Tyr Ile His Thr  
 165 170 175

Thr Leu Leu Pro Tyr Leu Lys Ala Ala Gly Glu Met Lys Thr Lys Pro  
 180 185 190

Thr Gln His Ser Val Lys Glu Leu Arg Gly Leu Gly Ile Gln Pro Asn  
 195 200 205

Met Leu Val Ile Arg Thr Glu Glu Pro Ala Gly Gln Gly Ile Lys Asn  
 210 215 220

Lys Leu Ala Gln Phe Cys Asp Val Ala Pro Glu Ala Val Ile Glu Ser  
 225 230 235 240

Leu Asp Val Glu His Leu Tyr Gln Ile Pro Leu Asn Leu Gln Ala Gln  
 245 250 255

Gly Met Asp Gln Ile Val Cys Asp His Leu Lys Leu Asp Ala Pro Ala

260	265	270
Ala Asp Met Thr Glu Trp Ser	Ala Met Val Asp Lys	Val Met Asn Leu
275	280	285
Lys Lys Gln Val Lys Ile Ser Leu Val Gly Lys Tyr Val Glu Leu Gln		
290	295	300
Asp Ala Tyr Ile Ser Val Val Glu Ala Leu Lys His Ser Gly Tyr Val		
305	310	315
Asn Asp Ala Glu Val Lys Ile Asn Trp Val Asn Ala Asn Asp Val Thr		
325	330	335
Ala Glu Asn Val Ala Glu Leu Leu Ser Asp Ala Asp Gly Ile Ile Val		
340	345	350
Pro Gly Gly Phe Gly Gln Arg Gly Thr Glu Gly Lys Ile Gln Ala Ile		
355	360	365
Arg Tyr Ala Arg Glu Asn Asp Val Pro Met Leu Gly Val Cys Leu Gly		
370	375	380
Met Gln Leu Thr Cys Ile Glu Phe Ala Arg His Val Leu Gly Leu Glu		
385	390	395
Gly Ala Asn Ser Ala Glu Leu Ala Pro Glu Thr Lys Tyr Pro Ile Ile		
405	410	415
Asp Ile Met Arg Asp Gln Ile Asp Ile Glu Asp Met Gly Gly Thr Leu		
420	425	430
Arg Leu Gly Leu Tyr Pro Ser Lys Leu Lys Arg Gly Ser Lys Ala Ala		
435	440	445
Ala Ala Tyr His Asn Gln Glu Val Val Gln Arg Arg His Arg His Arg		
450	455	460
Tyr Glu Phe Asn Asn Ala Phe Arg Glu Gln Phe Glu Ala Ala Gly Phe		
465	470	475
		480



Phe Glu Glu Ala Ile Phe Gly Thr Glu Lys Glu Val Lys Tyr His Arg  
 130 135 140

Glu Ala Gly Cys Arg Thr Cys Asn Gly Ser Gly Ala Lys Pro Gly Thr  
 145 150 155 160

Ser Pro Val Thr Cys Gly Arg Cys His Gly Ala Gly Val Ile Asn Val  
 165 170 175

Asp Thr Gln Thr Pro Leu Gly Met Met Arg Arg Gln Val Thr Cys Asp  
 180 185 190

Val Cys His Gly Arg Gly Lys Glu Ile Lys Tyr Pro Cys Thr Thr Cys  
 195 200 205

His Gly Thr Gly His Glu Lys Gln Ala His Ser Val His Val Lys Ile  
 210 215 220

Pro Ala Gly Val Glu Thr Gly Gln Gln Ile Arg Leu Ala Gly Gln Gly  
 225 230 235 240

Glu Ala Gly Phe Asn Gly Gly Pro Tyr Gly Asp Leu Tyr Val Val Val  
 245 250 255

Ser Val Glu Ala Ser Asp Lys Phe Glu Arg Glu Gly Thr Thr Ile Phe  
 260 265 270

Tyr Asn Leu Asn Leu Asn Phe Val Gln Ala Ala Leu Gly Asp Thr Val  
 275 280 285

Asp Ile Pro Thr Val His Gly Asp Val Glu Leu Val Ile Pro Glu Gly  
 290 295 300

Thr Gln Thr Gly Lys Lys Phe Arg Leu Arg Ser Lys Gly Ala Pro Ser  
 305 310 315 320

Leu Arg Gly Gly Ala Val Gly Asp Gln Tyr Val Thr Val Asn Val Val  
 325 330 335

Thr Pro Thr Gly Leu Asn Asp Arg Gln Lys Val Ala Leu Lys Glu Phe  
 340 345 350

Ala Ala Ala Gly Asp Leu Lys Val Asn Pro Lys Lys Lys Gly Phe Phe  
           355                                  360                                  365

Asp His Ile Lys Asp Ala Phe Asp Gly Glu  
       370                                  375

<210> 635  
 <211> 95  
 <212> PRT  
 <213> Streptococcus pneumoniae

<400> 635

Met Lys Leu Ser Asn Leu Leu Leu Phe Ala Gly Ala Ala Ala Gly Ser  
   1                  5                                  10                                  15

Tyr Leu Val Thr Lys Asn Arg Gln Thr Ile Thr Asp Glu Val Leu Asn  
           20                                  25                                  30

Thr Thr Asp Arg Val Gln Ala Ile Lys Asp Asp Val Asp Ile Ile Gln  
           35                                  40                                  45

Asn Ser Leu Gln Ile Ile Asn Gln Gln Lys Glu Leu Ile Lys Glu Tyr  
       50                                  55                                  60

Gln Glu Asp Leu Thr Tyr Lys Phe Lys Val Leu Glu Lys Asp Ile Gln  
   65                                  70                                  75                                  80

Thr Arg Leu Ala Val Ile Lys Glu Met Gln Gly Thr Glu Asp Lys  
           85                                  90                                  95

<210> 636  
 <211> 378  
 <212> PRT  
 <213> Streptococcus pneumoniae

<400> 636

Met Ser Lys Glu Met Leu Glu Ala Phe Arg Ile Leu Glu Glu Asp Lys  
   1                  5                                  10                                  15

Gly Ile Lys Lys Glu Asp Ile Ile Asp Ala Val Val Glu Ser Leu Arg  
       20                                  25                                  30

Ser Ala Tyr Arg Arg Arg Tyr Gly Gln Ser Asp Ser Val Ala Ile Asp  
 35 40 45

Phe Asn Glu Lys Thr Gly Asp Phe Thr Val Tyr Thr Val Arg Glu Val  
 50 55 60

Val Asp Glu Val Phe Asp Ser Arg Leu Glu Ile Ser Leu Lys Asp Ala  
 65 70 75 80

Leu Ala Ile Asn Ser Ala Tyr Glu Leu Gly Asp Lys Ile Lys Phe Glu  
 85 90 95

Glu Ala Pro Ala Glu Phe Gly Arg Val Ala Ala Gln Ser Ala Lys Gln  
 100 105 110

Thr Ile Met Glu Lys Met Arg Lys Gln Thr Arg Ala Ile Thr Tyr Asn  
 115 120 125

Thr Tyr Lys Glu His Glu Gln Glu Ile Met Ser Gly Thr Val Glu Arg  
 130 135 140

Phe Asp Asn Arg Phe Ile Tyr Val Asn Leu Gly Ser Ile Glu Ala Gln  
 145 150 155 160

Leu Ser Lys Gln Asp Gln Ile Pro Gly Glu Val Phe Ala Ser His Asp  
 165 170 175

Arg Ile Glu Val Tyr Val Tyr Lys Val Glu Asp Asn Pro Arg Gly Val  
 180 185 190

Asn Val Phe Val Ser Arg Ser His Pro Glu Met Ile Lys Arg Leu Met  
 195 200 205

Glu Gln Glu Ile Pro Glu Val Tyr Asp Gly Thr Val Glu Ile Met Ser  
 210 215 220

Val Ala Arg Glu Ala Gly Asp Arg Thr Lys Val Ala Val Arg Ser His  
 225 230 235 240

Asn Pro Asn Val Asp Ala Ile Gly Thr Ile Val Gly Arg Gly Gly Ala  
 245 250 255

Asn Ile Lys Lys Ile Thr Ser Lys Phe His Pro Ala Arg Tyr Asp Ala  
 260 265 270

Lys Asn Asp Arg Met Val Pro Ile Glu Glu Asn Ile Asp Val Ile Glu  
 275 280 285

Trp Val Ala Asp Pro Ala Glu Phe Ile Tyr Asn Ala Ile Ala Pro Ala  
 290 295 300

Glu Val Asp Gln Val Ile Phe Asp Glu Asn Asp Ser Lys Arg Ala Leu  
 305 310 315 320

Val Val Val Pro Asp Asn Lys Leu Ser Leu Ala Ile Gly Arg Arg Gly  
 325 330 335

Gln Asn Val Arg Leu Ala Ala His Leu Thr Gly Tyr Arg Ile Asp Ile  
 340 345 350

Lys Ser Ala Ser Glu Phe Glu Ala Met Glu Asp Ala Ala Ser Val Glu  
 355 360 365

Leu Glu Val Glu Asn Asp Thr Val Glu Glu  
 370 375

<210> 637

<211> 958

<212> PRT

<213> Streptococcus pneumoniae

<400> 637

Met Ser Lys Lys Arg Leu Tyr Glu Ile Ala Lys Glu Leu Gly Lys Glu  
 1 5 10 15

Ser Lys Glu Val Val Ala Arg Ala Lys Glu Leu Gly Leu Asp Val Lys  
 20 25 30

Ser His Ser Ser Ser Val Glu Glu Ala Val Ala Ala Lys Ile Ala Ala  
 35 40 45

Ser Phe Lys Pro Ala Ala Ala Pro Lys Val Glu Ala Lys Pro Ala Ala  
 50 55 60

Pro Lys Val Ser Ala Glu Lys Lys Ala Glu Lys Ser Glu Pro Ala Lys  
65 70 75 80

Pro Ala Val Ala Lys Glu Glu Ala Lys Pro Ala Ala Pro Lys Ala Ser  
85 90 95

Ala Glu Lys Lys Ala Glu Lys Ser Glu Pro Val Lys Pro Ala Val Ala  
100 105 110

Lys Glu Glu Ala Lys Pro Ala Glu Pro Val Thr Pro Lys Thr Glu Lys  
115 120 125

Val Ala Ala Lys Pro Gln Ser Arg Asn Phe Lys Ala Glu Arg Glu Ala  
130 135 140

Arg Ala Lys Glu Gln Ala Glu Arg Arg Lys Gln Asn Lys Gly Asn Asn  
145 150 155 160

Arg Asp Gln Gln Gln Asn Gly Asn Arg Gln Lys Asn Asp Gly Arg Asn  
165 170 175

Gly Gly Lys Gln Gly Gln Ser Asn Arg Asp Asn Arg Arg Phe Asn Asp  
180 185 190

Gln Ala Lys Lys Gln Gln Gly Gln Gln Lys Arg Arg Asn Glu Arg Arg  
195 200 205

Gln Gln Glu Asp Lys Arg Ser Asn Gln Ala Ala Pro Arg Ile Asp Phe  
210 215 220

Lys Ala Arg Ala Ala Ala Leu Lys Ala Glu Gln Asn Ala Glu Tyr Ala  
225 230 235 240

Arg Ser Ser Glu Glu Arg Phe Lys Gln Tyr Gln Ala Ala Lys Glu Ala  
245 250 255

Leu Ala Gln Ala Asn Lys Arg Lys Glu Pro Glu Glu Ile Phe Glu Glu  
260 265 270

Ala Ala Lys Leu Ala Glu Gln Ala Gln Gln Val Gln Ala Val Val Glu  
275 280 285



Val Val Pro Glu Lys Lys Glu Pro Ala Val Asp Thr Arg Arg Lys Lys  
 290 295 300

Gln Ala Arg Pro Asp Lys Asn Arg Asp Asp Tyr Asp His Glu Glu Asp  
 305 310 315 320

Gly Pro Arg Lys Gln Gln Lys Asn Arg Ser Ser Gln Asn Gln Val Arg  
 325 330 335

Asn Gln Lys Asn Ser Asn Trp Asn Asn Asn Lys Lys Asn Lys Lys Gly  
 340 345 350

Asn Asn Lys Asn Asn Arg Asn Gln Thr Pro Lys Pro Val Thr Glu Arg  
 355 360 365

Lys Phe His Glu Leu Pro Thr Glu Phe Glu Tyr Thr Asp Gly Met Thr  
 370 375 380

Val Ala Glu Ile Ala Lys Arg Ile Lys Arg Glu Pro Ala Glu Ile Val  
 385 390 395 400

Lys Lys Leu Phe Met Met Gly Val Met Ala Thr Gln Asn Gln Ser Leu  
 405 410 415

Asp Gly Glu Thr Ile Glu Leu Leu Met Val Asp Tyr Gly Ile Glu Ala  
 420 425 430

Lys Gln Lys Val Glu Val Asp Asn Ala Asp Ile Glu Arg Phe Phe Val  
 435 440 445

Glu Asp Gly Tyr Leu Asn Glu Asp Glu Leu Val Glu Arg Pro Pro Val  
 450 455 460

Val Thr Ile Met Gly His Val Asp His Gly Lys Thr Thr Leu Leu Asp  
 465 470 475 480

Thr Leu Arg Asn Ser Arg Val Ala Thr Gly Glu Ala Gly Gly Ile Thr  
 485 490 495

Gln His Ile Gly Ala Tyr Gln Ile Val Glu Asn Gly Lys Lys Ile Thr

500	505	510
Phe Leu Asp Thr Pro Gly His Ala Ala Phe Thr Ser Met Arg Ala Arg		
515	520	525
Gly Ala Ser Val Thr Asp Ile Thr Ile Leu Val Val Ala Ala Asp Asp		
530	535	540
Gly Val Met Pro Gln Thr Ile Glu Ala Ile Asn His Ser Lys Ala Ala		
545	550	555
Asn Val Pro Ile Ile Val Ala Ile Asn Lys Ile Asp Lys Pro Gly Ala		
565	570	575
Asn Pro Glu Arg Val Ile Gly Glu Leu Ala Glu His Gly Val Met Ser		
580	585	590
Thr Ala Trp Gly Gly Asp Ser Glu Phe Val Glu Ile Ser Ala Lys Phe		
595	600	605
Asn Gln Asn Ile Glu Glu Leu Leu Glu Thr Val Leu Leu Val Ala Glu		
610	615	620
Ile Gln Glu Leu Lys Ala Asp Pro Thr Val Arg Ala Ile Gly Thr Val		
625	630	635
Ile Glu Ala Arg Leu Asp Lys Gly Lys Gly Ala Val Ala Thr Leu Leu		
645	650	655
Val Gln Gln Gly Thr Leu Asn Val Gln Asp Pro Ile Val Val Gly Asn		
660	665	670
Thr Phe Gly Arg Val Arg Ala Met Thr Asn Asp Leu Gly Arg Arg Val		
675	680	685
Lys Val Ala Gly Pro Ser Thr Pro Val Ser Ile Thr Gly Leu Asn Glu		
690	695	700
Ala Pro Met Ala Gly Asp His Phe Ala Val Tyr Glu Asp Glu Lys Ser		
705	710	715
		720

Ala Arg Ala Ala Gly Glu Glu Arg Ala Lys Arg Ala Leu Met Lys Gln  
 725 730 735

Arg Gln Ala Thr Gln Arg Val Ser Leu Glu Asn Leu Phe Asp Thr Leu  
 740 745 750

Lys Ala Gly Glu Leu Lys Ser Val Asn Val Ile Ile Lys Ala Asp Val  
 755 760 765

Gln Gly Ser Val Glu Ala Leu Ser Ala Ser Leu Gln Lys Ile Asp Val  
 770 775 780

Glu Gly Val Lys Val Thr Ile Val His Ser Ala Val Gly Ala Ile Asn  
 785 790 795 800

Glu Ser Asp Val Thr Leu Ala Glu Ala Ser Asn Ala Phe Ile Val Gly  
 805 810 815

Phe Asn Val Arg Pro Thr Pro Gln Ala Arg Gln Gln Ala Glu Ala Asp  
 820 825 830

Asp Val Glu Ile Arg Leu His Ser Ile Ile Tyr Lys Val Ile Glu Glu  
 835 840 845

Met Glu Glu Ala Met Lys Gly Met Leu Asp Pro Glu Phe Glu Glu Lys  
 850 855 860

Val Ile Gly Glu Ala Val Ile Arg Glu Thr Phe Lys Val Ser Lys Val  
 865 870 875 880

Gly Thr Ile Gly Gly Phe Met Val Ile Asn Gly Lys Val Ala Arg Asp  
 885 890 895

Ser Lys Val Arg Val Ile Arg Asp Gly Val Val Ile Tyr Asp Gly Glu  
 900 905 910

Leu Ala Ser Leu Lys His Tyr Lys Asp Asp Val Lys Glu Val Thr Asn  
 915 920 925

Gly Arg Glu Gly Gly Leu Met Ile Asp Gly Tyr Asn Asp Ile Lys Met  
 930 935 940

Asp Asp Val Ile Glu Ala Tyr Val Met Glu Glu Ile Lys Arg  
 945 950 955

<210> 638  
 <211> 293  
 <212> PRT  
 <213> Streptococcus pneumoniae

<400> 638

Met Ala Ile Val Ser Ala Glu Lys Phe Val Gln Ala Ala Arg Asp Asn  
 1 5 10 15

Gly Tyr Ala Val Gly Gly Phe Asn Thr Asn Asn Leu Glu Trp Thr Gln  
 20 25 30

Ala Ile Leu Arg Ala Ala Glu Ala Lys Lys Ala Pro Val Leu Ile Gln  
 35 40 45

Thr Ser Met Gly Ala Ala Lys Tyr Met Gly Gly Tyr Lys Val Ala Arg  
 50 55 60

Asn Leu Ile Ala Asn Leu Val Glu Ser Met Gly Ile Thr Val Pro Val  
 65 70 75 80

Ala Ile His Leu Asp His Gly His Tyr Glu Asp Ala Leu Glu Cys Ile  
 85 90 95

Glu Val Gly Tyr Thr Ser Ile Met Phe Asp Gly Ser His Leu Pro Val  
 100 105 110

Glu Glu Asn Leu Lys Leu Ala Lys Glu Val Val Glu Lys Ala His Ala  
 115 120 125

Lys Gly Ile Ser Val Glu Ala Glu Val Gly Thr Ile Gly Gly Glu Glu  
 130 135 140

Asp Gly Ile Ile Gly Lys Gly Glu Leu Ala Pro Ile Glu Asp Ala Lys  
 145 150 155 160

Ala Met Val Glu Thr Gly Ile Asp Phe Leu Ala Ala Gly Ile Gly Asn  
 165 170 175

Ile His Gly Pro Tyr Pro Val Asn Trp Glu Gly Leu Asp Leu Asp His  
 180 185 190

Leu Gln Lys Leu Thr Glu Ala Leu Pro Gly Phe Pro Ile Val Leu His  
 195 200 205

Gly Gly Ser Gly Ile Pro Asp Glu Gln Ile Gln Ala Ala Ile Lys Leu  
 210 215 220

Gly Val Ala Lys Val Asn Val Asn Thr Glu Cys Gln Ile Ala Phe Ala  
 225 230 235 240

Asn Ala Thr Arg Lys Phe Ala Arg Asp Tyr Glu Ala Asn Glu Ala Glu  
 245 250 255

Tyr Asp Lys Lys Lys Leu Phe Asp Pro Arg Lys Phe Leu Ala Asp Gly  
 260 265 270

Val Lys Ala Ile Gln Ala Ser Val Glu Glu Arg Ile Asp Val Phe Gly  
 275 280 285

Ser Glu Gly Lys Ala  
 290

<210> 639  
 <211> 141  
 <212> PRT  
 <213> Streptococcus pneumoniae

<400> 639

Met Ala Lys Lys Val Glu Lys Leu Val Lys Leu Gln Ile Pro Ala Gly  
 1 5 10 15

Lys Ala Thr Pro Ala Pro Pro Val Gly Pro Ala Leu Gly Gln Ala Gly  
 20 25 30

Ile Asn Ile Met Gly Phe Thr Lys Glu Phe Asn Ala Arg Thr Ala Asp  
 35 40 45

Gln Ala Gly Met Ile Ile Pro Val Val Ile Ser Val Tyr Glu Asp Lys  
 50 55 60

Ser Phe Thr Phe Val Thr Lys Thr Pro Pro Ala Ala Val Leu Leu Lys  
65 70 75 80

Lys Ala Ala Gly Val Glu Lys Gly Ser Gly Thr Pro Asn Lys Thr Lys  
85 90 95

Val Ala Thr Val Thr Arg Ala Gln Val Gln Glu Ile Ala Glu Thr Lys  
100 105 110

Met Pro Asp Leu Asn Ala Ala Asn Val Glu Ser Ala Met Arg Met Ile  
115 120 125

Glu Gly Thr Ala Arg Ser Met Gly Phe Thr Val Val Asp  
130 135 140

<210> 640

<211> 229

<212> PRT

<213> Streptococcus pneumoniae

<400> 640

Met Ala Lys Lys Ser Lys Gln Leu Arg Ala Ala Leu Glu Lys Ile Asp  
1 5 10 15

Ser Thr Lys Ala Tyr Ser Val Glu Glu Ala Val Ala Leu Ala Lys Glu  
20 25 30

Thr Asn Phe Ala Lys Phe Asp Ala Thr Val Glu Val Ala Tyr Asn Leu  
35 40 45

Asn Ile Asp Val Lys Lys Ala Asp Gln Gln Ile Arg Gly Ala Met Val  
50 55 60

Leu Pro Asn Gly Thr Gly Lys Thr Ser Arg Val Leu Val Phe Ala Arg  
65 70 75 80

Gly Ala Lys Ala Glu Glu Ala Lys Ala Ala Gly Ala Asp Phe Val Gly  
85 90 95

Glu Asp Asp Leu Val Ala Lys Ile Asn Asp Gly Trp Leu Asp Phe Asp  
100 105 110

Val Val Ile Ala Thr Pro Asp Met Met Ala Leu Val Gly Arg Leu Gly  
 115 120 125

Arg Val Leu Gly Pro Arg Asn Leu Met Pro Asn Pro Lys Thr Gly Thr  
 130 135 140

Val Thr Met Asp Val Ala Lys Ala Val Glu Glu Ser Lys Gly Gly Lys  
 145 150 155 160

Ile Thr Tyr Arg Ala Asp Arg Ala Gly Asn Val Gln Ala Ile Ile Gly  
 165 170 175

Lys Val Ser Phe Glu Ala Glu Lys Leu Val Glu Asn Phe Lys Ala Phe  
 180 185 190

Asn Glu Thr Ile Gln Lys Ala Lys Pro Ala Thr Ala Lys Gly Thr Tyr  
 195 200 205

Val Thr Asn Leu Thr Ile Thr Thr Thr Gln Gly Val Gly Ile Lys Val  
 210 215 220

Asp Val Asn Ser Leu  
 225

<210> 641  
 <211> 620  
 <212> PRT  
 <213> Streptococcus pneumoniae  
 <400> 641

Met Asn Ile Ile Glu Glu Ile Met Thr Lys Leu Arg Glu Asp Ile Arg  
 1 5 10 15

Asn Ile Ala Ile Ile Ala His Val Asp His Gly Lys Thr Thr Leu Val  
 20 25 30

Asp Glu Leu Leu Lys Gln Ser Glu Thr Leu Asp Ala Arg Thr Glu Leu  
 35 40 45

Ala Glu Arg Ala Met Asp Ser Asn Asp Ile Glu Lys Glu Arg Gly Ile  
 50 55 60

Thr Ile Leu Ala Lys Asn Thr Ala Val Ala Tyr Asn Gly Thr Arg Ile  
65 70 75 80

Asn Ile Met Asp Thr Pro Gly His Ala Asp Phe Gly Gly Glu Val Glu  
85 90 95

Arg Ile Met Lys Met Val Asp Gly Val Val Leu Val Val Asp Ala Tyr  
100 105 110

Glu Gly Thr Met Pro Gln Thr Arg Phe Val Leu Lys Lys Ala Leu Glu  
115 120 125

Gln Asp Leu Val Pro Ile Val Val Val Asn Lys Ile Asp Lys Pro Ser  
130 135 140

Ala Arg Pro Ala Glu Val Val Asp Glu Val Leu Glu Leu Phe Ile Glu  
145 150 155 160

Leu Gly Ala Asp Asp Asp Gln Leu Asp Phe Pro Val Val Tyr Ala Ser  
165 170 175

Ala Ile Asn Gly Thr Ser Ser Leu Ser Asp Asp Pro Ala Asp Gln Glu  
180 185 190

Ala Thr Met Ala Pro Ile Phe Asp Thr Ile Ile Asp His Ile Pro Ala  
195 200 205

Pro Val Asp Asn Ser Asp Glu Pro Leu Gln Phe Gln Val Ser Leu Leu  
210 215 220

Asp Tyr Asn Asp Phe Val Gly Arg Ile Gly Ile Gly Arg Val Phe Arg  
225 230 235 240

Gly Thr Val Lys Val Gly Asp Gln Val Thr Leu Ser Lys Leu Asp Gly  
245 250 255

Thr Thr Lys Asn Phe Arg Val Thr Lys Leu Phe Gly Phe Phe Gly Leu  
260 265 270

Glu Arg Arg Glu Ile Gln Glu Ala Lys Ala Gly Asp Leu Ile Ala Val  
275 280 285